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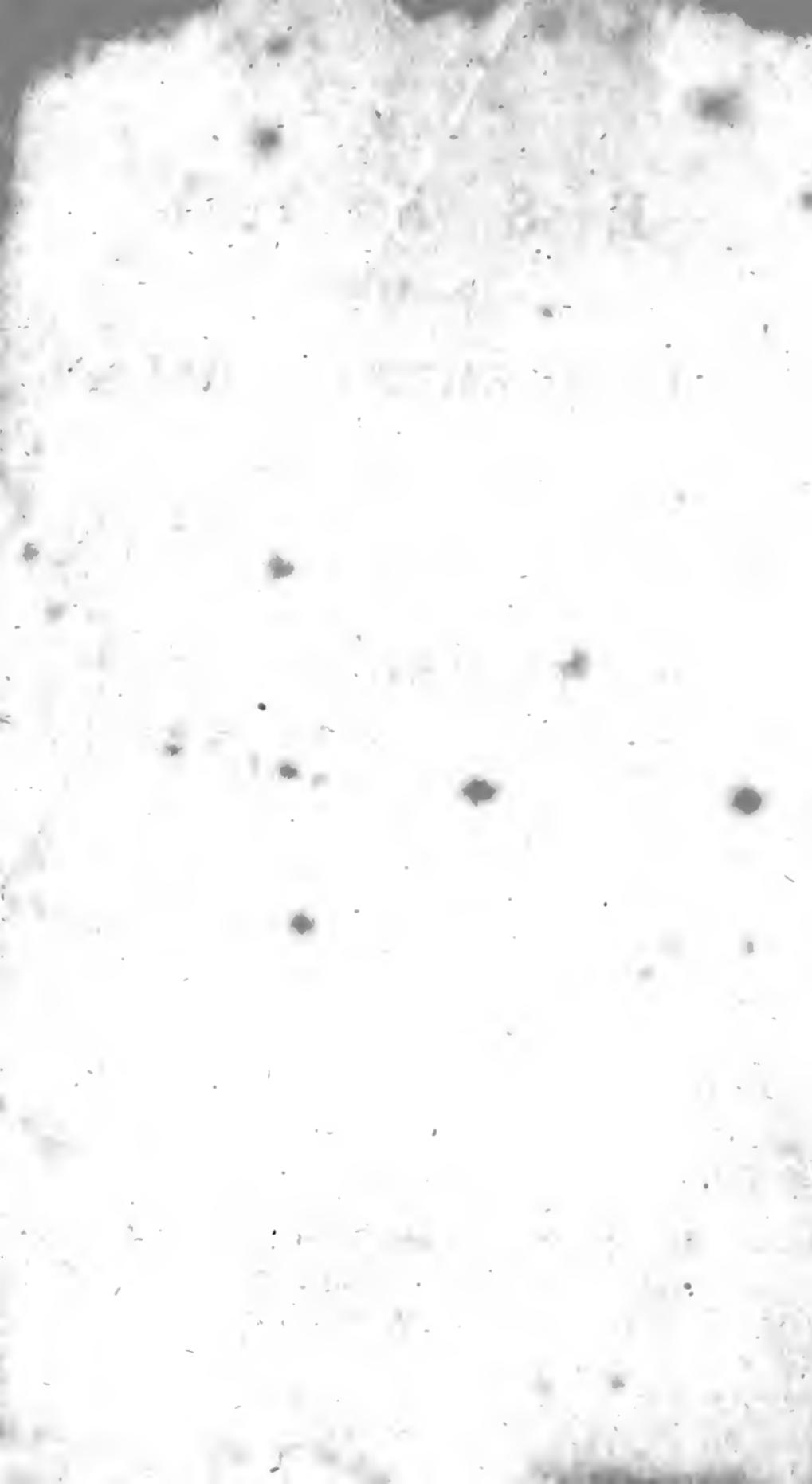
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A N
E S S A Y
O N T H E
MANAGEMENT of BEES.

WHEREIN IS SHEWN
The Method of rearing those useful Insects;

A N D
That the Practice of saving their Lives when their Honey and Wax are taken from them was known to the Antients, and is, in itself, simple and easily executed.

By JOHN MILLS, F.R.S.

Member of the Royal Societies of Agriculture of Paris and of Roüen, and of the Oeconomical Society of Berne.

Sic vos et yobis mellificatis Apes.

L O N D O N:

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T O

The SOCIETY for the Encouragement of
ARTS, MANUFACTURES, and COMMERCE,

This ESSAY on the
Management of BEES,

Published in consequence of the Desire of that
respectable Body to promote the Means of
saving the Lives of those useful Insects, is
humbly inscribed, by

THE SOCIETY's
most obedient, and
most humble Servant,

John Mills.

May, 1766.

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THE following sheets were originally intended to make a part of the continuation of my general System of Husbandry, which I purpose finishing so soon as my health will permit*. They would, consequently, not have appeared at this time, nor in this detached manner, if the notice which our excellent Society for the Encouragement of Arts, &c. has thought proper to take of the importance of saving the lives of Bees, when their honey and wax, the only retribution that man has any right to expect from their labours, are taken from them, had not called on me to offer every assistance in my power, as well to those who, through a laudable

* The five volumes already published of *Mills's System of Practical Husbandry*, in 8vo. price 1 l. 5 s. in sheets, are sold by the publishers of this Essay.

tenderness

iv ADVERTISEMENT.

tenderness of heart, are grieved to see the common barbarous practice of destroying these profitable creatures, as to those who may be induced to become candidates for the well judged premium generously offered by that truly respectable Body.

IN this view, to a concise account of the generation, government, and œconomy of Bees, I have, with the help of the most approved writers, both ancient and modern, added such directions for managing them, as will, I hope, suffice to instruct the husbandman in every thing necessary for the due care of these useful and industrious insects; and also, for his still better guidance, I have described particularly the several methods used by different nations, to reap the sweets of their labour without destroying the little labourers themselves. It is highly probable that this was known in very early times: for the Roman writers speak of it as a common practice in their days; and it still

still continues to be the custom in Greece, where modern improvements can hardly be supposed to have reached.

SOME readers may, perhaps, think me too minutely particular in my accounts of the several methods practised in different countries. My reason is, that chance often directs people to the practice best suited to their climate, and to circumstances which those at a distance cannot so well determine. There not only arises a pleasure from being acquainted with a variety of methods; but this farther satisfaction may ensue, that one or more of them will sometimes afford profitable hints to the ingenious, in similar cases.

GENTLEMEN, whose leisure and love of physical inquiries may lead them to more minute researches into the history and œconomy of Bees, will not rest satisfied with what could properly come within the compass of a work like this, purposely suited to the purchase and perusal of all keepers of Bees. Such readers

viii A D V E R T I S E M E N T.

readers are therefore referred to those naturalists who have thought this curious and useful insect worthy of their particular attention. Swammerdam, Miraldi, and Réaumur, have distinguished themselves on this subject, and will afford great satisfaction to those who shall consult them.

P R E M I U M

PREMIUM FOR PRESERVING
THE LIVES OF BEES; OFFER-
ED BY THE SOCIETY OF ARTS,
&c. (Year 1765, p. 16.)

“ WHEREAS the usual method of
“ saving the honey from stocks or
“ hives is by destroying the bees, and whereas
“ it is found by experience, that the honey
“ and wax may be obtained, and the bees
“ preserved at the same time, by which much
“ larger quantities of both wax and honey
“ are collected.

“ 100. THE Society will give a sum not
“ exceeding two hundred pounds, for collect-
“ ing wax and preserving the lives of the
“ bees, in the following proportion: to every
“ person who shall collect from stocks of bees,
“ his own property, within the year 1767,
“ ten pounds of clear merchantable wax, with-
“ out destroying the bees, leaving a sufficient
“ quantity of honey for their winter suste-
“ nance; five pounds.

“ BUT in case there shall be above forty
“ claimants, then the sum of two hundred
“ pounds shall be distributed among the can-
“ didates in proportion to the number of
“ claimants:

“ CER..

“ CERTIFICATES of the quantity of wax
“ and of the bees in each stock being alive
“ on the first of February 1768, to be deli-
“ vered on or before the first of March fol-
“ lowing.”

“ N. B. A complete *Apparatus* for the
“ purposes above-mentioned may be seen at
“ the Society’s office in the Strand.”

AND, I must add, at Mr. Thorley’s, op-
posite the mansion-house, in the city,
with bees in the hives.

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A N

A N
E S S A Y
O N T H E
Management of Bees.

I N T R O D U C T I O N.

WE may consider a hive of bees as a well peopled city, in which we commonly find from fifteen to eighteen thousand inhabitants. This city is in itself a monarchy, composed of a *queen*, of males, which are the *drones*, and of *working bees*, which are not of either sex. The combs, which are of pure wax, serve as their magazine of stores, and for the nursing places of their young offspring. There is between the combs a space sufficient for two bees to march a-breast, without embarrassing each other; and in some parts it is more spacious. There are also holes, or narrow passes, which cross the combs transversely, and are intended to shorten the way when the bees pass from one comb to another.

B

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O F T H E Q U E E N B E E .

THE QUEEN (*Pl. I. Fig. 1*) is easily distinguished from the other bees, by the form of her body: she is longer and larger than they are, has straiter legs, and her wings are much shorter than theirs in proportion to her body; for the wings of the other bees cover their whole body, whereas those of the queen hardly reach beyond her middle, or end at about the third ring of her belly. Her hinder parts are more taper than those of the other bees, terminating sharper. Her belly and legs are of a deep yellow, much resembling the purest gold. The queen, like the working bees, has a sting; contrary to the opinion of many writers, who may have taken this for granted, because she is extremely pacific. One may handle her, turn her, and even tease her for some time, before she determines herself to vengeance. Her sting differs not from that of the working bee, excepting that it is bigger, and a little curved. The venom of bees is burning and caustic.

A HIVE of bees cannot subsist without a queen, as she alone produces their numerous posterity; and on this account their fidelity and attachment to their sovereign is admirable. Instances of this attachment are so numerous, that it would be needless to mention

tion any other than the following, from father Labat, for its singularity. He relates, that "he received a visit from a man who " called himself the master of the bees: whe- " ther he was their master or no, it is cer- " tain they followed him as a flock of sheep " does their shepherd, and even closer too: " for he was entirely covered with them. " His cap, particularly, was so covered, " that it perfectly resembled those swarms, " which, endeavouring to settle, fix on some " branch of a tree. He was bid to take it off, " and did so; whereupon the bees placed " themselves on his shoulder, his head, and " his hands, without stinging him, or even " those who were near him. He was press- " ed to tell his secret, but all that could be " got out of him was, that he was the ma- " ster of the bees. They all followed him " when he retired: for, besides those he " carried about with him, he had legions, " which attended him." It may be pre-
sumed that this juggler had a queen bee concealed, and that it was this which made the whole swarm follow him. However, I should hardly have related this story upon the credit of a writer who is not always to be believed, if I had not myself received the following account of a somewhat similar person now living at Plymouth.

A GENTLEMAN in that neighbourhood, willing to be an eye-witness of what this man could do, sent for him to his house, and carried him into his garden, where the man took up several hives, and looked into them, thereby to judge which could best spare part of their honey. This he did without seeming at all to apprehend the bees, and without being in the least hurt by them. He then desired that a cloth might be spread on a table in the dwelling house, and upon that he laid the hive he had pitched upon, bottom upmost; after this he desired all the company to quit the room, saying, that he would inform them when they might return with safety. He soon called in the owner of the bees, who told him, that his wife and children wished to be admitted, if it could be done without danger to them. The man declared that they might enter with perfect safety, for that the bees would not molest any one. They accordingly went in, though amidst a cloud of bees; the man having expelled them from the hive. He then put his hand into a cluster of bees which adhered together on the table, and took out of it the queen bee, which he kept for some time concealed. A manifest confusion was thereupon instantly observed among the bees; but upon his placing her on the end of the table farthest from the hive, numbers of them immediately resorted to her, and she proceeded on their backs to the hive. He took her

her up a second time, and held her in his hand, upon which the bees then settled in such numbers as to hang in a cluster from it. He then placed her again at the farthest end of the table, and from thence she proceeded towards the hive, in the same manner as before. Having at length taken out of the hive the quantity of honey-combs which he thought proper, he permitted the queen to enter into the hive, and all her subjects followed her. The hive was then returned to its place in the garden, and all this was done without one person's being stung.

SWAMMERDAM, whose veracity no one will doubt, relates, that having tied a small bit of thread round one of the legs of the queen bee, and fastened the other end of the thread to the extremity of a long pole, the whole swarm immediately assembled round the end of this pole, to cover the queen, and all the bees were carried wherever the bearer of the pole pleased to conduct them.

WHEN a queen dies by any accident, the bees of her hive immediately cease working, consume their own honey, fly about their own and other hives at unusual hours, when other bees are at rest, and die rather than be without her, on whom alone depends the supply of future labourers. Her loss is proclaimed by a clear and interrupted humming. This sign should be a warning to the owner of the bees, to take what honey remains in the

hive, or to procure them another queen; the manner of doing which will be directed hereafter.

THE dissection of the queen bee shews evidently that she lays may thousand eggs; and observations as well as anatomy evince, that these eggs are impregnated by the drones or males, in the same manner as other insects couple. It is computed that the *Ovaria* of a queen bee contain more than five thousand eggs at one time; and therefore it is not difficult to conceive that a queen bee may produce ten or twelve thousand bees, or even more, in the space of two months.

O F T H E D R O N E S.

DRONES (*Pl. i. Fig. 2.*) are smaller than the queen, and larger than the working bees; and in flying they make a greater noise. If a hive is opened in the beginning of spring, not a single drone will be found in it; from the middle of *May* to the end of *June*, hundreds of them will be found, commonly from two or three hundred to a thousand; and from thence to the following spring, it would be in vain to seek for them. They go not out till eleven in the morning, and return before six in the evening. To live, seems to be their only business: yet their dissection informs us that they have the male parts of

of generation, and observations have assured us that they couple with the queen. While their presence is thus necessary for the queen, or whilst, in the opinion of many, their warmth is necessary to cherish the young, they are suffered to enjoy the sweets of love and life; but as soon as they become useless in the hive, the working bees declare the most cruel war against them, and make terrible slaughter of them. The stings of the working bees give them an advantage, which more than counter-balances the size of the drones, who have not any sting: besides, we frequently see several working bees set on one drone. This war affects not only the bees already in life, but even the eggs and maggots; for the law which has pronounced the destruction of the males has no exception, it extends equally to those which do not yet breathe and to those which do; the hive is cleared of every egg, maggot, or nymph; the whole is torn away and carried off. After the season proper for increasing the number of bees is past, and when they should attend only to the supplying of their magazines sufficiently with winter stores, every vestige of the drones is destroyed to make room for honey. Whenever drones are observed to remain in a hive late in the autumn, it is held to be a bad sign of the state of the hive.

OF THE WORKING BEES.

TH E WORKING BEES (*Pl. I. Fig. 3.*) compose the greatest body of the state. *Columella* informs us ^a that the ancients distinguished several kinds of them. He joins in opinion with *Virgil*^b, who approves of those which are small, oblong, smooth, bright, and shining, of gentle and mild disposition: “for,” continues he, “by how much the larger and rounder the bee is, by so much the worse it is; but if it be fierce and cruel it is the worst of all. The angry disposition of bees of a better character is easily softened by the frequent intercourse of those who take care of them, for they grow more tame when they are often handled.” The experience of ages has now established the sort of bees which have been found to answer best the purposes of keeping them.

THE working bees have the care of the hive, collect the wax and honey, fabricate and work up the wax, build the cells, feed the young, keep the hive clean, drive from thence strangers, and employ themselves in all other concerns relating to the hive.

^a *De Re Rustica*, lib. ix. c. 3.

^b *Georg.* lib. iv. l. 98.

INSECTS which may seem to the incurious to be little deserving their notice, afford to an attentive mind many instances of the wisdom of God in the Creation; yet, as these are matters of curiosity, rather than of use, I shall pass them over, referring the curious to *Swammerdam* and *Réaumur*; and only observe that the working bee has two stomachs, one which contains the honey, and a second in which is contained the crude wax. The working bees have no parts analogous to the *Ovaria* of the queen, or that resemble the male organs of the drones.

THE sting is very necessary for a working bee, both as an offensive and as a defensive weapon; for their honey and wax excite the envy of many greedy and lazy insects; and they have also to defend themselves against enemies, who are fonder of eating them than their honey. There is likewise a time when the drones must be sacrificed and exterminated for the good of the society; and as they are larger and stronger than the working bees, these last would have a very unequal match, were it not for this poisonous sting. There happen also among bees, either of the same or of different hives, most deadly feuds, in which their stings are their chief weapons. In these contests, great skill may be discerned in their manner of pointing the sting between the scaly rings which cover their bodies, or to some

some other easily vulnerable part. The bee which first gains the advantage remains the conqueror; though the victory costs the victor his life, if he has left his sting in the body of the enemy; for, with the sting, so much of his body is torn out, that death inevitably follows. Bees have very severe conflicts when whole hives engage in a pitched battle; and many are slain on both sides: but of this hereafter. They have sometimes a fight of robbery, when three or four set on one who has a store of honey in his stomach, merely to make him disgorge it.

OIL of olives, or any mild oil, is thought by many to be a cure for the pain and inflammation arising from the sting of a bee; but repeated experiments have shewn that it fails oftener than it succeeds. It seems probable, that the success sometimes met with was rather an accident than a cure; for there are many people to whom the sting of a bee does not occasion any pain or inflammation: some men disdain to use the least precaution even when they are sure of many stings. There are, perhaps, many other remedies which owe their reputation to similar causes. Vinegar is equally unsuccessful: bruised parsley is by many thought to give ease; and, as was observed in my *System of Husbandry*^c, Mr.

Rocque, of *Walham-green*, says, that being stung even by a wasp, the leaves of burnet, rubbed pretty hard upon the part so injured, immediately took off the inflammation. One very necessary caution is, to pull out the sting from the wound as soon as possible, for the longer it remains in it the deeper it pierces; owing to the peculiar make of the sting itself.

O F T H E W A X.

THE balls which we see attached to the legs of bees returning to the hive are not wax, but a powder collected from the *stamina* of flowers, and not yet brought to the state of wax. The substance of these balls heated in any vessel, does not melt as wax would do, but becomes dry and hardens: it may even be reduced to a coal. If thrown into water, it will sink; whereas wax swims. To reduce this crude substance into wax, it must first be digested in the body of the bee.

AFTER the bees have brought home this crude substance, they eat it by degrees; or, at other times, three or four bees come and ease the loaded bee by eating each of them a share, the loaded bee giving them a hint so to do. Hunger is not the motive of their thus eating the balls of waxy matter, especially when a swarm is first hived; but it is their desire to provide a speedy supply of real wax for making

ing the combs. At other times, when there is no immediate want of wax, the bees lay this matter up in repositories, to keep it in store.

WHEN this waxy matter is swallowed, it is, by the digestive powers of the bee, converted into real wax, which the bees again disgorge as they work it up into combs; for it is only while thus soft and pliant from the stomach that they can fabricate it properly. That the wax thus employed is taken from their stomachs, appears from their making a considerable quantity of comb soon after they are hived, and even on any tree or shrub where they have rested but a short while before their being hived, though no balls were visible on their legs, excepting those of a few which may be just returned from the field. " This is farther confirmed by what happened in a swarm newly hived; for two days together from the time of their quitting their former home, it rained constantly; insomuch that not one bee was able to stir out during that time: yet at the end of the two days, they had made a comb fifteen or sixteen inches long, and thick in proportion^d."

THE crude wax, when brought home by the bees, is often of as different colours as are the flowers from which it is collected: but the new combs are always of a white co-

^d Natural Hist. of Bees, p. 226.

lour,

lour, which is afterwards changed only by the impurities arising from the steam, &c. of the bees.

BEES collect crude wax also for food; for if this was not the case, there would be no want of wax after the combs are made: but they are observed, even in old hives, to return in great numbers loaded with such matter, which is deposited in particular cells, and is known by the name of bee-bread. We may guess that they consume a great deal of this substance in food, by the quantity collected, which, by computation, may in some hives amount to an hundred weight in a season, whilst the real wax in such an hive does not perhaps exceed two pounds ^{c.}

O F T H E C O M B S.

IN constructing habitations within a limited compass, an architect would have three objects in view; first, to use the smallest quantity that can be of materials; next, to give to the edifice the greatest capacity on a determined space; and thirdly, to employ the spot in such a manner that none of it may be lost. On examination, it will be found that the bees have obtained all these advantages in the hexagonal form of their cells: for, first,

^c Natural Hist. of the Bees, p. 233.

there

there is an oeconomy of wax, as the circumference of one cell makes part of the circumferences of those contiguous to it; secondly, the oeconomy of the spot, as these cells which join to one another leave no void between them; and thirdly, the greatest capacity or space; as of all the figures which can be contiguous, that with six sides gives the largest area. This thriftiness prompts them to make the partitions of their cells thin: yet they are constructed so as that the solidity may compensate for the scantiness of materials. The parts most liable to injury are the entrance of the cells. These the bees take care to strengthen, by adding quite round the circumference of the apertures a fillet of wax, by which means this mouth is three or four times thicker than the sides; and they are strengthened at the bottom, by the angle formed by the bottom of three cells falling in the middle of an opposite cell.

THE combs lie parallel to each other, and there is left between every one of them a space which serves as a street, broad enough for two bees to pass by each other. There are holes which go quite through the combs, and serve as lanes for the bees to pass from one comb to another, without being obliged to go a great way about. When they begin their combs, they form at the top of the hive a root or stay to the whole edifice, which is to hang from

from it. Though they generally lay the foundations of the combs so that there shall be no more space between them than what is sufficient for two bees to pass, yet they sometimes place those beginnings of two combs too far asunder; and in this case, in order to fill up part of the void space arising from that bad disposition, they carry their combs on obliquely, to make them gradually approach each other. This void space is sometimes so considerable, that the bees build in it an intermediate comb, which they terminate as soon as the original combs have only their due distances. As the combs would be apt, when full, to overcome by their weight all the security which the bees can give them against falling; they who prepare hives set in them, cross-ways, sticks, which serve as props to the combs, and save the bees a great deal of labour.

IT is commonly supposed that the cells are the habitations which the bees build for themselves. This opinion arises from its being observed, that, at certain times, each cell has a bee in it: but a closer examination will discover, that many cells have in them young maggots, or *nymphæ*; that many serve as store-houses for the crude wax; and many more for the honey on which the bees are to subsist during the winter or bad weather.

O F T H E H O N E Y.

IT was generally believed, that honey is a dew which falls from heaven, and that the bees had no other share in it than collecting it. It is originally a juice digested in plants, which sweats through their pores, and chiefly in their flowers, or is contained in reservoirs in which nature stores it. The bees sometimes penetrate into these stores, and at other times find the liquor exuded. This they collect in their stomachs; so that when, loaded with it, they seem to an inattentive eye to come home without any booty at all. The bees which gather crude wax shew their industry; but it is not so with those which collect honey. The stomach in which the honey is contained is well known to most boys.

THE Abbé Boissier de Sauvages having discovered a substance not before attended to, which the bees collect and turn to honey; I shall here give the purport of what he says in a memoir read before the Society of Sciences at Montpellier, on the 16th of December 1762, on the origin of honey^f.

HE begins with declaring it to be his opinion, that the bees have no other share in the making of honey, than simply collecting it.

^f *Observations sur l'Origine du Miel, par M. L'Abbé Boissier de Sauvages, à Nîmes, 1763.*

Other writers believe, that when the liquor which the bees collect has been for some time in their stomachs, it comes from thence changed into true honey; the liquor having been there properly digested and rendered thicker than when it entered. The Abbé *Boissier's* opinion is supported by the honey's being still a body subject to a vinous fermentation when properly diluted, which does not obtain in any animal substance that I know of.

BESIDES the liquor already mentioned, which is obtained from the flowers of plants, the Abbé acquaints us, that he has seen two kinds of honey-dews, which the bees are equally fond of: both derive their origin from vegetables, though in very different ways.

THE first kind, the only one known to husbandmen, and which passes for a dew that falls on trees, is no other than a mild sweet juice, which, having circulated through the vessels of vegetables, is separated in proper reservoirs in the flowers, or on the leaves, where it is properly called the honey-dew: sometimes it is deposited in the pith, as in the sugar-cane, and at other times in the juice of pulpy summer fruits, when ripe. Such is the origin of the manna which is collected on the ash and maple of *Calabria* and *Briançon*, where it flows in great plenty from the leaves and

trunks of these trees, and thickens into the form in which it is usually seen.

"CHANCE," says the Abbé Boissier, "afforded me an opportunity of seeing this juice in its primitive form on the leaves of the holm-oak: these leaves were covered with thousands of small round globules or drops, which, without touching one another, seemed to point out the pore from whence each of them had proceeded. My taste informed me that they were as sweet as honey: the honey-dew on a neighbouring bramble did not resemble the former, the drops having run together; owing either to the moisture of the air, which had diluted them, or to the heat, which had expanded them. The dew was become more viscous, and lay in larger drops, or, plaster-wise, covering the leaves. This is the form it is usually seen in."

"THE oak had at this time two kinds of leaves; the old, which were strong and firm, and the new, which were tender and lately come forth. The honey-dew was found only on the old leaves, though these were covered by the new ones, and by that means sheltered from any moisture that could fall from above. I observed the same on the old leaves of the bramble, while the new leaves were quite free of it. Another proof that this dew proceeds from the leaves is, that other

“ other neighbouring trees which do not afford a juice of this kind, had no moisture on them; and particularly the mulberry, which is a very happy circumstance, for this juice is a deadly poison to silk-worms. If this juice fell in the form of a dew, mist, or fog, it would wet all the leaves without distinction, and every part of the leaves, under as well as upper. Heat may have some share in its production: for though the common heat promotes only the transpiration of the more volatile and fluid juices; a sultry heat, especially if reflected by clouds, may so far dilate the vessels, as to bring forth a thicker and more viscous juice, such as the honey-dew.

“ THE second kind of honey-dew, which is the chief resource of bees after the spring flowers and dew by transpiration on leaves are past, owes its origin to a small mean insect, the excrement thrown out by which, makes a part of the most delicate honey we ever taste^f.

“ THESE lice rest during several months on the bark of particular trees, and extract their food by piercing that bark, without hurting the tree, or bringing upon it any

^f The French call this insect a *Puceron*, and our country people, whose appellation of it will be adopted here, generally call it, I think, a *Louse*, though a species peculiar to vegetables.

“ deformity; as do those insects which make
“ the leaves of some trees curl up, or cause
“ galls to grow upon others. They settle on
“ branches which are a year old. The juice,
“ at first perhaps hard and crabbed, becomes,
“ in the bowels of this insect, equal in sweet-
“ ness to the honey obtained from the flowers
“ and leaves of vegetables, excepting that the
“ flowers may communicate some of their
“ essential oil to the honey, and that this may
“ give it a peculiar flavour; as happened to
“ myself, by planting a hedge of rosemary
“ near my bees at *Sauvages*, the honey has
“ tasted of it ever since; that shrub continu-
“ ing long in flower.

“ I HAVE observed two species of lice which
“ live unsheltered on the bark of young
“ branches: they have a smooth skin, and
“ those without wings seem to be the females,
“ which make the great bulk of the swarm;
“ for each swarm has in its train two or three
“ males with wings: these live on the labours
“ of the females, at least I always saw them
“ hopping carelessly on the backs of the fe-
“ males, without going to the bark to seek
“ for food.

“ BOTH species live in groups on different
“ parts of the same tree. They there stick
“ close to one another around the branch,
“ entirely covering the bark; and it is re-
“ markable that they there take a position
“ which

“ which may seem to us to be a very uneasy
“ one ; for they adhere to the branch with
“ their head downward, and their belly up-
“ permost.

“ THE lesser species is of the colour of the
“ bark on which it feeds, and that is generally
“ green. It is chiefly distinguished by two
“ horns, or strait immovable fleshy sub-
“ stances, which rise perpendicular from the
“ lower sides of the belly, one on each side.
“ This is the species which lives on the young
“ shoots of brambles and of elder.

“ THE former of these species is double
“ the size of this last, and is that which I
“ now have most particularly in view, because
“ it is that from which the honey comes.
“ These insects are blackish, and instead of
“ the kind of horns which distinguish the
“ others, they have, in the same part of the
“ skin, a small button, black and shining like
“ jet.

“ THE buzzing of bees in a tuft of French
“ or holm oak, made me suspect that some
“ very interested view brought so many of
“ them thither. I knew that it was not the
“ season for expecting honey-dew, nor such
“ the place where it usually is, and was sur-
“ prized to find in the centre of the tuft leaves
“ and branches covered with drops which the
“ bees collected with a humming noise. The
“ form of the drops drew my attention, and

“ led to the following discovery. Instead of
“ being round, like drops which had fallen,
“ each of these formed a little longish oval.
“ I soon perceived from whence they pro-
“ ceeded. The honeyed leaves were situated
“ beneath a swarm of the larger black lice;
“ and on observing these insects, I saw them
“ from time to time raise their bellies, at the
“ extremity of which there then appeared a
“ transparent amber coloured drop, which
“ they instantly darted from them to the dis-
“ tance of some inches. I found, on tasting
“ some which I had catched on my hand,
“ that it had the same flavour with what had
“ before fallen on the leaves. I afterwards
“ saw the smaller kind dart their drop in the
“ same manner.

“ THIS darting, to which the drop owes
“ its oval form, is not a matter of indiffer-
“ ence to these insects themselves, but seems
“ to have been wisely instituted in order to
“ preserve cleanliness in each individual, as
“ well as among the whole swarm: for, pref-
“ fing as they do one upon another, they
“ would otherwise soon be glued together,
“ and rendered incapable of stirring.

“ WE may now, with some probability,
“ account for the seemingly odd situation in
“ which they rest. Their belly is about twenty
“ times larger than their head and breast. If
“ the insect was placed in a contrary direction,
“ it

“ it could not, without extreme difficulty,
“ raise its heavy belly, so as to project it out-
“ ward, sufficiently to discharge the drop
“ over its companions; whereas, when its
“ head is lowermost, much less effort is re-
“ quisite to incline it forward; and even in
“ this situation the insect seems by its flut-
“ tering to collect all its strength. When
“ the winter’s cold and rains come on, these
“ lice place themselves wherever they are
“ least exposed; and as they then take but
“ little nourishment, and but seldom emit
“ their drop, they seem not to mind whether
“ the head or tail be uppermost.

“ THE drops thus spurted out fall upon
“ the ground, if leaves or branches do not
“ intervene; and the spots which they make
“ on stones remain long, unless they are
“ washed off by rain. This is the only
“ honey-dew that falls; and this never falls
“ from a greater height than a branch on
“ which these insects can cluster.

“ IT now is easy to account for a pheno-
“ menon which formerly puzzled me much.
“ Walking under a lime tree in the king’s gar-
“ den at *Paris*, I felt my hands wetted with
“ little drops, which I at first took for small
“ rain. The tree should have sheltered me
“ from rain, but I escaped it by going from
“ under the tree. A seat placed by the tree
“ shone with these drops. Being then unac-

“ quainted with any thing of this kind, except the honey-dew which is found upon leaves, I was at a loss to conceive how so glutinous a substance could fall from the leaves in such small drops; for I knew that rain could not overcome its natural adherence to the leaves, till it became pretty large drops: but I have since found, that the lime tree is very subject to these insects.

“ BEES are not the only insects which feast on this honey. Ants are equally fond of it. Led into this opinion by what naturalists have said, I at first believed that the horns in the lesser species of these lice, had at their extremity a liquor which the ants went in search of: but I soon discovered, that what drew the ants after them came from elsewhere, both in the larger and the lesser species, and that no liquor is discharged by the horns.

“ THERE are two species of ants which search for these insects. The large black ants follow those which live on the oak and chesnut: the lesser ants attend those of the elder. As the ants are not provided with the means of sucking up fluids, they place themselves near the lice, in order to seize the drop the moment they see it appear on the anus: and as the drop remains some time on the small lice, before they can

“ can dart it off, the ants have leisure to
“ catch it, and thereby prevent the bees from
“ having any share of it: but the lice of the
“ oak and chesnut being stronger, and per-
“ haps more plentifully supplied with juice,
“ dart the drop instantly, so that the larger
“ ants get very little of it.

“ THE lice finding the greatest plenty of
“ juice in trees in the middle of the summer,
“ afford also at that time the greatest quantity
“ of honey; and this lessens as the season
“ advances, so that, in the autumn, the bees
“ prefer to it the flowers then in season.

“ THOUGH these insects pierce the trees to
“ the sap, in a thousand places, yet the trees
“ do not seem to suffer at all from them, nor
“ do the leaves lose the least of their verdure.
“ The husbandman acts therefore injudici-
“ ously when he destroys them.”

FROM whatever source the bees have collected their honey, the instant they return home, they seek cells in which they may disgorge and deposit their loads. They have two sorts of stores; one which consists of honey laid up for the winter, and the other of honey intended for accidental use, in case of bad weather, and for such bees as do not go

^g For the farther history of these insects, the curious reader may consult M. *de Réaumur*, and M. *Bonnet* of Geneva. A part of the Writings of this last very ingenious gentleman will, I hear, shortly make its appearance in English, under the title of *Contemplations on Nature*.

abroad in search of it. Their method of securing each of these is different. They have in each cell a thicker substance, which is placed over the honey, to prevent its running out of the cell, and that substance is raised gradually as the cell is filled, till the bees, finding that the cell cannot contain any more, close it with a covering of wax, not to be opened till times of want, or during the winter.

O F T H E P R O P O L I S.

THE matter with which bees close every crevice in their hives, and which is called *propolis*, is a kind of resin easy to be rolled out, much more tenacious than wax, and more easily fixed. It does not seem to require any preparation, being a real resin, which they collect from trees, and employ as they find it. It grows very hard in the hive, but may be softened by heat. It is dissoluble in spirit of wine. It commonly diffuses a very agreeable smell when heated. Its outward colour is of a reddish brown; its inside resembles wax, and is a little yellowish. When the bees make use of it, it is soft and pliable; but it hardens daily, and becomes in time harder than wax. This propolis serves also for another purpose, which is, that when a snail, slug, or any other creature too large to

be

be carried out by the bees, has been slain in the hive, they case it over with this substance, and thereby prevent the bad effects of the putrid smell arising from dead bodies.

OF THE MANNER IN WHICH THE BEES BREED.

IT has already been observed, that the cells are intended for other purposes besides being places of store for honey. One of their chief uses is, their being, if I may so term it, nurseries for the young. The cells for the young which are to be working bees, are commonly half an inch deep, those for drones three quarters of an inch, and those which are intended for keeping of honey only, still deeper. This accounts for the inequalities observed in the surface of combs.

THE queen deposits an egg in each cell, after having previously examined every way whether it be fittest for a working bee, or for a drone. During this time, as indeed on all other occasions, she is attended by a number of bees, ready to do her every kind office. We may judge of the number of eggs which a queen lays, by the number of bees sent out from one stock in one season. Suppose the eggs to be laid in March, sooner or later, according as the season is, and the swarm to take its flight about the middle or end of

of May ; yet, notwithstanding their departure, the hive remains more peopled than it was in the beginning of the spring. The swarm, without being a very strong one, may consist of twenty thousand bees, produced in about two months. A second, and even a third swarm, may also proceed from the same hive or stock. A singular circumstance attending this prodigious fecundity of the queen, is, that she keeps in her body, for several months, that impregnating matter which was given by the males, who were put to death without mercy in the latter end of the preceding summer : and yet, when the new males are come to life in May, they impregnate eggs, which are laid within a few days after.

THE reverend Mr. Thorley remarks ^b, that, " to his certain knowlege, the bees sometimes breed all the summer season without drones. Several poor and weak stocks, which have but few bees, and but little honey, have not any drones among them all the season ; and yet these shall increase, prosper, and breed drones the following summer. I will give my readers, says he, only one instance instead of a multitude.

" ONCE I had a stock of bees, which not only bred great numbers all the spring-time,

^b Enquiry into the Nature, Order, and Government of Bees, p. 74. 2d. edit.

" but

“ but also swarmed without any drones, as I
“ was fully assured from the most strict and
“ constant observation. Had there been one
“ single drone in it, my eye or ear would
“ certainly have discovered him.

“ THE old stock continued to prosper ;
“ and in about a month or six weeks, some
“ drones, though few comparatively, appear-
“ ed in it.

“ THE new swarm increased in numbers
“ all that summer, but had no drones among
“ them till the following spring.—And I add
“ farther, that I have oft-times known weak
“ stocks, which have not bred drones for the
“ space of about two years.”

THE queen lays one egg in the bottom of each cell. The eggs are hatched in a few days after they have been laid ; a maggot then appears at the bottom of the cell, and if the season be at all favourable, this maggot acquires its full growth in a few days more ; generally in five or six. There it is regularly nourished by the working bees, who are very careful in the discharge of that office. It is not easy to determine what its food is, nor would it be of great use to relate the opinions of different authors concerning it. After the maggot has lived five or six days, or sometimes a little longer, according as the season is more or less favourable, it prepares for its change into a nymph, or *chrysalis*. In order

to

to this, the bees shut it up in its lodging, by blocking up the entry with wax; and that done, it is left to itself. It then hangs the cell with a soft dry consistent matter resembling silk, which, like the silk-worm, it spins out of its own body.. This lining may be easily discovered by melting gently the wax of a cell thus stopped up, or by breaking it with care: the wax separates, and the silky tapestry remains. When the nymph is become a bee, and it has pierced the wax with which it was imprisoned, the working bees come that instant to clean the cell of all filth ; but they do not destroy the tapestry. The cell thus purified serves to bring up another maggot, the egg of which the queen deposits in it. The second maggot spins like the first ; so that the same cell may be hung thus with a new lining several times in a year. The nymph undergoes several changes before it becomes a bee: but all its metamorphoses are completed in about fifteen days. The space of time which intervenes between the laying of the egg and the birth of the bee, may therefore be reckoned twenty-three or twenty-four days in favourable seasons. In cold weather, the process is longer; and if the weather proves very unfavourable, many die in that state, especially in the spring, as may be judged from the numbers dragged forth dead by the working bees. Instinct teaches them industry as soon as they are able to fly.

YOUNG bees are easily distinguished from the old, by their brown colour and white hair; both the colour and the hair of the old ones being red. The wings too of the young ones become more distinct, as they grow older. The bee just produced has a great belly, and if it be opened, it is found to be full of the substance it had eaten whilst a maggot. Add to these differences, the state of their wings, which are found and entire in youth, and in a more advanced age, are broken and notched by hard labour. If we examine by these marks the bees either of a swarm or of an old hive, we shall find some young, some old; and some of a middle age.

THE eggs from which drones are to proceed, are, as already observed, laid in larger cells than those of the working bees. The coverings of these cells, when the drones are in their nymph-state, are convex or swelling outward, whilst the cells of the working bees are flat. This, with the privilege of leading idle effeminate lives, and not working for the publick stock, is what distinguishes the drones.

THE bees depart from their usual stile of building when they are to raise cells for bringing up such maggots as will become queens. These are of a longish oblong form, having one end bigger than the other, with their exterior surface full of little cavities. Wax, which

which is employed with so geometrical a thriftiness in the raising of hexagonal cells, is expended with profusion in the cell which is to be the cradle of a royal maggot. They sometimes fix it in the middle, and at other times on one side, of a comb. Several common cells are sacrificed to serve as a basis and support to it. It is placed almost perpendicular to the common cells, the largest end being uppermost. The lower end is open till the season for closing it comes, or till the maggot is ready for transformation. It would be difficult to conceive how a tender maggot can remain in a cell turned bottom upmost, if we did not find it buried in a substance scarcely fluid, and if it was not in itself, at first, small and light enough to be suspended in this clammy paste. As it grows, it fills all the upper and larger part of the cell. As soon as the young queen comes out of her cell, that cell is destroyed, and its place is supplied by common cells: but as the foundation of the royal cell is left, this part of the comb is found thicker than any other. There are several such cells prepared; for the queen lays from seven or eight to twenty royal maggots; and if there was only one reared in each hive, the swarms might often want a conductress. Many accidents may also destroy the little maggot, before it becomes a bee. It is therefore necessary that the queen should

should lay more than one of these royal eggs: and there are several young queens in the beginning of the summer, more than one of which often takes flight when a swarm departs.

A young queen is in a condition to lead a swarm from a hive in which she was born, in four or five days after she has appeared in it with wings; and when she has resolved on her journey, her eggs have been already impregnated; as appears evidently from there being swarms among which there is not a single male, and from eggs having been found in cells within twenty-four hours after the settling of the swarm. The bees of a swarm are in a great hurry when they know that their queen is ready to lay. In this case, they give to their new cells but part of the depth they are to have, and defer the finishing of them till they have traced the number of cells requisite for the present time. The cells first made are intended only for working bees; these being the most necessary.

It sometimes happens, even when the bees are very assiduous and busy, that they on a sudden cease from their work, not a single one stirs out, and those that are abroad hurry home in such prodigious crowds, that the doors of their habitations are too small to admit them. On this occasion, look up to the sky, and you will soon discover some of those black clouds which denote impending rain.

O F T H E I R S W A R M I N G .

WHEN the hive is become too much crowded, by the addition of the young brood, a part of the bees think of finding themselves a more commodious habitation, and with that view single out the most forward of the young queens. A new swarm is therefore constantly composed of one queen at least, and of several thousand working bees, as well as of some hundreds of drones. The working bees are some old, some young.

SCARCE has the colony arrived at its new habitation, when the working bees labour with the utmost diligence, to procure materials for food and building. Their principal aim is not only to have cells in which they may deposit their honey. A stronger motive seems to animate them. They seem to know that their queen is in haste to lay her eggs. Their industry is such, that in twenty-four hours they will have made combs twenty inches long, and wide in proportion. They make more wax during the first fortnight, if the season is favourable, than they do during all the rest of the year. Other bees are at the same time busy in stopping all the holes and crevices they find in their new hive, in order to guard against the entrance of insects which covet their honey, their wax, or themselves; and also to exclude the cold air; for it

it is indispensably necessary that they be lodged warm.

WHEN the bees first settle in swarming, indeed when they at any time rest themselves, there is something very particular in their method of taking their repose. It is done, by collecting themselves in a heap, and hanging to each other by their feet. They sometimes extend these heaps to a considerable length. It would seem probable to us, that the bees from which the others hang, must have a considerable weight suspended to them. All that can be said is, that the bees must find this to be a situation agreeable to themselves. They may perhaps have a method of distending themselves with air, thereby to lessen their specific gravity; in the same manner as fishes do, in order to alter their gravity compared with water.

WHEN a swarm divides into two or more bands, which settle separately; this division is a sure sign that there are two or more queens among them. One of these clusters is generally larger than the other. The bees of the smaller cluster, or clusters, detach themselves by little and little, till at last the whole, together with the queen, or queens, unite with the larger cluster. As soon as the bees are hived and settled, the supernumerary queen, or queens, must be sacrificed to the peace and tranquillity of the hive. This execution generally raises a considerable commotion in the

hive, and several other bees, as well as the queen or queens, lose their lives. Their bodies may be observed on the ground, near the hive. The queen that is chosen is of a more reddish colour than those which are destroyed: so that fruitfulness seems to be a great motive of preference in bees; for the nearer they are to the time of laying their eggs, the bigger, larger, and more shining are their bodies. In this case, it surely would be adviseable to destroy the supernumerary queen, or queens, by intoxicating the bees in the evening, in the manner which will be taught hereafter.

THE reverend Mr. Thorley mentionsⁱ “ his having known the young queen fall upon the ground, not being able to fly, through some defect in her wings. Then the swarm returns home again; and the next time they rise, they have another sovereign. I have known, continues he, the swarm stay in the hive near a fortnight before they rose again. Sometimes they rose no more. The poor disabled queen I have picked up in the grafts, but never without some attendants, whom nothing but violence could separate from her.”

FOR three or four nights before a swarm sallies forth, there is in the hive a peculiar humming noise, of which authors give very different descriptions, probably owing to the

ⁱ p. 112.

strength

strength of imagination in each. Every sound among bees arises from their striking their wings against the air: their wings being their sole organ of voice, if I may be allowed the expression. By moving their wings more or less forcibly and swiftly, they beat the air, and form the varied and confused sounds which we call humming. The noise which foretells their swarming is easily distinguished by those who are accustomed to it, and is more especially observed before the casts, or second and following swarms. The hive appears so full of bees, that part of them hang in clusters on the outside; and the drones are perceived flying about in greater numbers than usual. But the most certain sign, and which indicates this event to be on that day, is, that the bees refrain from flying into the fields, though the season seems inviting. Just before they take their flight, there is an uncommon silence in the hive, and this continues for some time: but as soon as one breaks forth, they all follow, and are instantly on the wing. They seldom swarm before the sun has warmed the air; that is, not before ten in the morning, and seldom later than three in the afternoon: and the time of the year in which they most generally swarm, is from the middle of *May* to the end of *June*; but sometimes sooner or later, according as the season is more or less favourable. The earliest swarms do not always prove the best,

especially if they are so early as the end of April or beginning of May: for the weather often is afterwards so wet and cold, that they are frequently in danger of being destroyed, or greatly reduced, by famine. Though swarms which issue forth so late as July are not in danger of a present famine; yet they scarcely have time and opportunity to lay in a sufficient store for the winter. Towards the season of swarming, the door of the hive should be enlarged, to give the bees the greater freedom to issue out; and it should likewise remain so for young swarms, during the first fortnight or three weeks, to allow the freer entrance to the bees at that time extremely busy in collecting their necessary stores. The entrance should afterwards be gradually lessened, to prevent the otherwise easy access of enemies, of which there is great danger, especially as the autumn advances.

HIVES continue sometimes to send forth swarms till the old hive becomes too much weakened, and part of it is empty. It is probable, that the prolific young queens prompt the bees to swarm thus frequently: for it is certain, that if there is not a young mother qualified to bring forth a numerous progeny, though there be ever so great a number of bees, they will all remain, and die rather than quit the hive. This is confirmed by the author of the Natural History of Bees. "I
" have

" have drowned," says he ^k, " several hives, " the swarms in which could not be forced " out by any means; and after examining " all the bees attentively, I ever found that " there was but one single mother, and this " the old one; the eggs or maggots of the " young queen bees having, I suppose, been " destroyed by some accident."

WHENEVER the bees of a swarm fly too high, they are made to descend lower, and disposed to settle, by throwing among them handfuls of sand or dust: probably the bees mistake this for rain. It is usual at the same time to beat on a kettle or frying-pan; perhaps from its being observed that the noise of thunder prompts such bees as are in the fields to return home. Precautions of this kind are the more necessary, if, as Dr. Warder observes ^l, " the bees always provide a place for their habitation before they swarm; either in some hollow tree, or in the hollow part of some old building, or in some deserted hive, which the swarm have already prepared, by cleaning out whatever may be offensive to their cleanly nature." Of this he gives an instance; and concludes, that " though they provide themselves of a house before they swarm, and take much pains about it; yet if you are early enough in your

^k P. 323. ^l The true Amazons, or the Monarchy of Bees; 8th edit. p. 77.

“ taking the swarm, and they find them-
“ selves at unawares in a convenient house,
“ they have no mind generally to leave it: but
“ if they rise again the same or next day,
“ be sure hive them not in the same hive
“ again, for it is plain they have some dis-
“ like to it.”

As soon as the swarm is settled, the bees which compose it should be got into a hive with all convenient speed, to prevent their taking wing again. If they settle on a small branch of a tree, easy to be come at, it may be cut off and laid upon a cloth; the hive being ready immediately to put over them. If the branch cannot be conveniently cut, the bees may be swept from off it into a hive. Lodge but the queen in the hive, and the rest will soon follow. If the bees must be considerably disturbed in order to get them into a hive; the most adviseable way is to let them remain in the place where they have pitched, till the evening, when there is less danger of their taking wing. If it be observed that they still hover about the place they first alighted upon, the branches there may rubbed with rue, or elder leaves, or any other thing distasteful to them, to prevent their returning to it.

THE hive employed on this occasion should be cleaned with the utmost care, and its inside be rubbed very hard with a coarse cloth, to get off the loose straws, or other impurities,

ties, which might cost them a great deal of time and labour to gnaw away. It may then be rubbed with fragrant herbs or flowers, the smell of which is agreeable to the bees, or with honey.

THE hive should not be immediately set on the stool where it is to remain, but should be kept near the place at which the bees settled, till the evening, lest some stragglers should be lost. It should be shaded, either with boughs, or with a cloth, that the too great heat of the sun may not annoy the bees.

We sometimes see a swarm of bees, after having left their hive, and even alighted upon a tree, return to their first abode. This never happens but when the young queen did not come forth with them, for want of strength, or perhaps courage to trust to her wings for the first time; or possibly from a consciousness of her not being impregnated.

BEES are not apt to sting when they swarm; therefore it is not necessary then to take much extraordinary precaution against them. The reverend Mr. Thorley gives a remarkable instance of this; and I mention it the rather, because the steady resolution shewn by the maid on this occasion, is the surest safeguard on any other. He relates it thus^m.

“ IN the year 1717, one of my swarms
“ settling among the close-twisted branches

“ of a codling-tree, and not to be got into a
“ hive without help, my maid-servant being
“ in the garden, offered her assistance, to
“ hold the hive while I dislodged the bees.

“ HAVING never been acquainted with
“ bees, she put a linen cloth over her head
“ and shoulders, to guard and secure her
“ from their swords. A few of the bees fell
“ into the hive; some upon the ground; but
“ the main body upon the cloth which co-
“ vered her upper garments.

“ I TOOK the hive out of her hands, when
“ she cried out, the bees were got under the
“ covering, crowding up towards her breast
“ and waist; which put her into a trembling
“ posture. When I perceived the veil was
“ of no farther service, she gave me leave to
“ remove it. This done, a most affecting
“ spectacle presented itself to the view of all the
“ company, filling me with the deepest distress
“ and concern, as I thought myself the un-
“ happy instrument of drawing her into so
“ imminent hazard of her life.

“ HAD she enraged them, all resistance had
“ been in vain, and nothing less than her life
“ would have atoned for the offence.

“ I SPARED not to urge all the arguments
“ I could think of, and use the most affec-
“ tionate intreaties, begging her with all ear-
“ nestness in my power, to stand her ground,
“ and keep her present posture; in order to
“ which, I gave her encouragement to hope

“ for a full discharge from her disagreeable
“ companions.

“ I BEGAN to search among them for the
“ queen, now got in a great body upon her
“ breast, about her neck, and up to her
“ chin. I immediately seized her, taking
“ her from among the croud with some of
“ the commons in company with her, and
“ put them together into the hive. Here I
“ watched her for some time, and as I did
“ not observe that she came out, I conceived
“ an expectation of seeing the whole body
“ quickly abandon their settlement; but in-
“ stead of that, I soon observed them gather-
“ ing closer together, without the least signal
“ for departing. Upon this I immediately
“ reflected, that either there must be another
“ sovereign, or that the same was returned.
“ I directly commenced a second search, and
“ in a short time, with a most agreeable sur-
“ prize, found a second, or the same: she
“ strove, by entering farther into the croud,
“ to escape me, but I re conducted her, with
“ a great number of the populace, into the
“ hive. And now the melancholy scene be-
“ gan to change, to one infinitely more agree-
“ able and pleasant.

“ THE bees presently missing their queen,
“ began to dislodge, and repair to the hive,
“ crowding into it in multitudes, and in the
“ the greatest hurry imaginable. And in the
“ space of two or three minutes the maid
“ had

" had not a single bee about her, neither had
" she so much as one sting, a small number
" of which would have quickly stopped her
" breath."—It is however adviseable for those
who are not accustomed to them, to cover
face and hands.

A SECOND swarm scarcely is, and much less
are the subsequent ones, worth keeping single;
because, being few in number, they cannot
allow so large a proportion of working bees
to go abroad in search of store, as more nu-
merous swarms can, after having appointed a
proper number for the various works to be
done within. For this reason it is adviseable
to unite two or more of these last or latter
swarms into one hive, so as to procure a suf-
ficient number of bees in one hive. Bees
sometimes swarm so often, that the mother-
hive is too much weakened. In this case, the
swarms should be restored back; and this
should also be done when a swarm produces
a swarm the first summer, as it sometimes
does. The best way, indeed, is to prevent
such swarming, by giving the bees more
room: though this, again, will not answer
where there is a young pregnant queen; she
well knowing that her life is the forfeit of her
remaining at home.

OF UNITING SWARMS.

THE usual method of uniting swarms is very easy. Spread a cloth at night upon the ground close to the hive in which the two caits or swarms are to be united; lay a stick a-cross this cloth; then fetch the hive with the new swarm, set it over the stick, give a smart stroke on the top of the hive, and all the bees will drop down upon the cloth, in a cluster. This done, throw aside the empty hive, take the other from off the stool, and set this last over the bees, who will soon ascend into it, mix with those already there, and become one and the same family. Others, instead of striking the bees down upon the cloth, place with its bottom upmost the hive in which the united swarms are to live, and strike the bees of the other hive down into it. The former of these hives is then restored to its natural situation, and the bees of both hives soon unite. If some bees still adhere to the other hive, they may be brushed off on the cloth, and they will soon join their brethren. Or one may take the following method, which gives less disturbance to the bees. Set with its mouth upmost the hive into which the young swarm has been put, and set upon it the other hive. The bees in the lower hive, finding themselves in an inverted situation, will soon ascend into the upper.

THOUGH

THOUGH all writers acknowledge, that one of the queens is constantly slain on these occasions, and generally a considerable number of the working bees ; yet none of them, *Columella* excepted ⁿ, has proposed the easy remedy of killing the queen of the latter cast or swarm before the union is made ; a means by which the lives of the working bees may be preserved. This may be done, either by intoxicating them, and then picking her out, or by searching her out when the bees are beaten down upon the cloth ; for this being done in the night, to prevent the battle which might otherwise ensue, there will be no great difficulty in finding her.

A LARGE swarm may weigh eight pounds, and so gradually less, to one pound : consequently a very good one may weigh five or six pounds. All such as weigh less than four pounds should be strengthened, by uniting to each of them a less numerous swarm. The size of the hive should be proportioned to the number of the bees ; and, as a general rule, it should be rather under than over-sized, because bees require to be kept warmer than a large hive will admit of.

Two authors of reputation differ greatly in their accounts of the number of bees in a hive ; the one, the author of the *Natural History of Bees* ^o, making the number of bees

ⁿ Lib. 9. c. 9.

^o P. 341.

weighing

weighing a pound to be five thousand three hundred and seventy-six; and the other, the reverend Mr. Thorley p, making the number of bees in a pound to be but fifteen hundred. The different circumstances of the bees may occasion a considerable difference in their weight; yet not sufficient to make three to one. Mr. Thorley's bees had newly swarmed, and were consequently loaded with honey and wax; and the other bees were such as had been killed in, battle. Having no opportunity to make the experiment myself, I must let the fact remain undetermined on the authority of the two above-mentioned experimentors.

"I PUT," says the author of the Natural History of bees, "into a scale, a half-ounce weight; and, in the other scale, as many bees as made the *equilibrium*. You will suppose that I was obliged to employ dead bees for this purpose. I must observe, by the way, that these were bees which had been killed in a dreadful battle; occasioned by a band of aliens, who endeavoured to seize upon a peopled hive. One hundred and sixty-eight of these dead bees weighed but half an ounce. There consequently are twice an hundred and sixty-eight bees in an ounce, that is, three hundred and thirty-six. Now, if three hundred and thirty-six bees weigh an ounce, there

“ must be five thousand three hundred
 “ and sixty-six in sixteen ounces or a pound;
 “ and consequently forty-three thousand eight
 “ hundred bees to weigh eight pounds. To
 “ avoid all suspicion of error in our calcula-
 “ tion, we will reduce the number of bees
 “ to forty thousand. This still will be a good
 “ handsome quantity, and more considerable
 “ than that of the inhabitants of many cities.
 Mr. THORLEY, “ putting the bees of a
 “ small and late swarm, into an empty hive,
 “ and afterwards (having intoxicated them)
 “ upon a table, took a particular account
 “ of their measure, weight, and number;
 “ and found them to be, in measure a quart,
 “ in weight one pound and a quarter, and in
 “ number two thousand.”

O F T H E A P I A R Y.

CO L U M E L L A ^q directs, that the Apiary face the south, in a place neither too hot, nor too much exposed to the cold; that it be in a valley, in order that the loaded bees may with the greater ease descend to their homes; that it be near the mansion-house, on account of the conveniency of watching them, but so situated as not to be exposed to noisome smells, or to the din of men or cattle; that it be surrounded with a

^q Lib. ix. c. 5.

wall,

wall, which however should not rise above three feet high; that, if possible, a running stream be near them, or, if that cannot be, that water be brought near them in troughs, with pebbles or small stones in the water, for the bees to rest on whilst they drink; or that the water be confined within gently declining banks, in order that the bees may have safe access to it; they not being able to produce either combs, honey, or food for their maggots, without water. That the neighbourhood of rivers or basins of water with high banks be avoided, because winds may whirl the bees into them, and they cannot easily get on shore from thence to dry themselves; and that the garden in which the apiary stands be well furnished with such plants as afford the bees plenty of good pasture. The trees in this garden should be of the dwarf kind, and their heads bushy, in order that the swarms which settle on them may be the more easily hived.

THE proprietor should be particularly attentive that the bees have also in their neighbourhood such plants as yield them plenty of food. Columella ^r enumerates many of these fitted to a warm climate: among them he mentions thyme, the oak, the pine, the sweet smelling cedar, and all fruit trees. Experience has taught us, that furze, broom, mus-

^r Lib. ix. c. 4.

tard, clover, heath, &c. are excellent for this purpose. Pliny ^s recommends broom, in particular, as a plant exceedingly grateful and very profitable to bees ; and Mr. Bradley speaks so highly of the advantages which arise from the planting of it for the food of these useful insects, that I hope my readers will pardon the length of the following quotation from the *Complete Body of Husbandry*, of this lastt.

“ OF the broom we have two sorts which
 “ will grow freely in England ; viz. the com-
 “ mon sort of the fields, and the Spanish
 “ broom, which till very late has been pro-
 “ pagated and cultivated only in the gardens ;
 “ but at present some gentlemen have raised it
 “ in their fields, by my advice ; and though
 “ they could never before have any profit
 “ by bees, they are now masters of weighty
 “ stocks ; and also have begun to find the
 “ good effect of these plants for binding and
 “ working of baskets, for they produce long
 “ and tough withs, not to be worn or broken
 “ like withs of willows or osiers. The
 “ bloom or flower of this sort is also very
 “ beautiful and sweet, perfuming the air like
 “ orange-flowers in May, which invite the
 “ bees and enrich them very greatly, so that
 “ their hives are full betimes in the summer.
 “ And considering the profit of honey and
 “ wax, when bees prosper, I think that

^s Lib. xxi. c. 12.

^t p. 179.

“ whatever ground happens to be planted
“ with such flowering plants, as give them a
“ large share of nourishment, and afford them
“ plenty of wax and honey, may be said to
“ be valuable: for from the observations I
“ have made of bees, and the manner of
“ gathering their honey, one may reason-
“ ably conjecture, that an acre of ground
“ which is cultivated with so rich a flower-
“ ing-shrub, will bring such a return as will
“ pay the rent; provided the neighbouring
“ parts do not keep many bees, to rob our
“ own stocks; for by a calculation, which
“ one may justly enough make on the bees
“ account, one may conclude, that an acre
“ of Spanish broom will afford wax and ho-
“ ney enough for ten good stocks of bees:
“ for this broom brings a vast quantity of
“ flowers fertile both in honey and wax, and
“ continues blowing a long time. And when
“ a stock of bees have flowers to their liking,
“ of which this is one of the chief, and have
“ a large quantity of them, they will fill their
“ hive both with wax and honey, in five or
“ six weeks, if the weather will permit them
“ to go abroad: but this hazard is no more
“ than other crops are subject to, the wea-
“ ther having the management of all crops,
“ either for their well or ill fare. The com-
“ mon broom is no way comparable to the
“ Spanish broom, either for its flowers, or
“ its withs.”

PLANTATIONS of mustard, of the flowers of which bees are extremely fond, may be kept in bloom for several weeks running.

OF SHIFTING THE ABODE OF BEES,

For the Convenience of procuring them Food.

GREAT improvements may certainly be made in the essential article of providing plenty of pasture for bees, whenever this subject shall be more carefully attended to, than it, unfortunately, has hitherto been. A rich corn country is well known to be a barren desert to them during the most considerable part of the year; and therefore the practice of other nations, in shifting the places of abode of their bees, well deserves our imitation.

COLUMELLA ^u informs us, that, as few places are so happily situated as to afford the bees proper pasture both in the beginning of the season and also in the autumn, it was the advice of Celsus, that after the vernal pastures are consumed, the bees should be transported to places abounding with autumnal flowers; as was practised by conveying the bees from Achaia to Attica, from Eubœa and the Cyclad islands to Scyrus, and also in Sicily, where they were brought to Hybla from other

^u Lib. ix. c. 14.

parts of the island. He likewise directs, that the hives be carefully examined before they are removed from one place to another, and to take out such combs as appear old, loose, or have moths in them, reserving only those that are found, in order that the hive may be stored with combs collected from the best flowers.

WE find by Pliny, that this was likewise the practice of Italy in his time. “ As soon, ” says he ^v, as the spring food for bees has “ failed in the vallies near our towns, the “ hives of bees are put into boats, and car- “ ried up against the stream of the river, in “ the night, in search of better pasture. The “ bees go out in the morning, in quest of “ provisions, and return regularly to their “ hives in the boats, with the stores they have “ collected. This method is continued, till “ the sinking of the boats to a certain depth “ in the water shews that the hives are suf- “ ficiently full; and they are then carried “ back to their former homes, where their “ honey is taken out of them.”

A MUCH later writer, Alexander de Montfort, shews this to be still the practice of the Italians who live near the banks of the Po, (the River which Pliny instanced particularly in the above quoted passage) when he says ^w that, treating their bees in nearly the same manner as the Egyptians did and do theirs,

^v Lib. xxi. c. 12. ^w Natural Hist. of Bees, p. 427.

they load boats with hives, and convey them to the neighbourhood of the mountains of Piedmont; that, in proportion as the bees gather in their harvest, the boats, by growing heavier, sink deeper into the water; and that the watermen determine from thence, when their hives are loaded sufficiently; and that it is time to carry them back to the places from whence they came. The same author relates^x, that the people of the country of Juliers used the same practice; for that, at a certain season of the year, they carried their bees to the foot of mountains covered with wild thyme.

M. MAILLET relates, in his curious description of Egypt, that “ spite of the ignorance and rusticity which have got possession of that country, there yet remain in it several footsteps of the industry and skill of the antient Egyptians. One of their most admirable contrivances is, their sending their bees annually into distant countries, in order to procure them sustenance there, at a time when they could not find any at home; and their afterwards bringing them back; like shepherds who should travel with their flocks, and make them feed as they go. It was observed by the antient inhabitants of lower Egypt, that all plants blossomed, and the fruits of the

^x Natural Hist. of Bees, p. 428.

^y Tom. II. p. 24.

“ earth

“ earth ripened, above six weeks earlier in
“ upper Egypt, than with them. They ap-
“ plied this remark to their bees; and the
“ means then made use of by them, to en-
“ able these usefully industrious insects to
“ reap advantage from the more forward state
“ of nature there, were exactly the same as
“ are now practised, for the like purpose, in
“ that country. About the end of October,
“ all such inhabitants of the lower Egypt as
“ have hives of bees, embark them on the
“ Nile, and convey them upon that river
“ quite into upper Egypt; observing to time
“ it so that they arrive there just when the
“ inundation is withdrawn, the lands have
“ been sown, and the flowers begin to bud.
“ The hives thus sent are marked and num-
“ bered by their respective owners, and placed
“ pyramidically in boats prepared for the pur-
“ pose. After they have remained some days
“ at their farthest station, and are supposed
“ to have gathered all the wax and honey
“ they could find in the fields within two or
“ three leagues around; their conductors
“ convey them, in the same boats, two or
“ three leagues lower down, and there leave
“ the laborious insects so long time as is ne-
“ cessary for them to collect all the riches of
“ this spot. Thus, the nearer they come to
“ the place of their more permanent abode,
“ they find the productions of the earth, and
“ the plants which afford them food, for-

“ ward in proportion. In fine, about the
“ beginning of February, after having tra-
“ velled through the whole length of Egypt,
“ gathering all the rich produce of the de-
“ lightful banks of the Nile, they arrive at
“ the mouth of that river, towards the ocean;
“ from whence they set out, and from whence
“ they are now returned to their several homes:
“ for care is taken to keep an exact register of
“ every district from whence the hives were
“ sent in the beginning of the season, of their
“ numbers, of the names of the persons who
“ sent them, and likewise of the mark or
“ number of the boat in which they were
“ placed.”

THE author of the Natural History of Bees gives the following account of what is practised in this way in France; an example well worth our imitation in many parts of this kingdom. “ M. Proutaut, says he^z, keeps a great number of hives. His situation is one of those in which flowers become rare or scarce very soon, and where few or none are seen after the corn is ripened. He then sends his bees into Beauce, or the Gatinois, in case it has rained in those parts. This is a journey of about twenty miles, which he makes them take. But if he concludes that the bees could not meet, in either of those counties, wherewith to employ

^z p. 428.

themselves

“ themselves advantageously, he then has them
“ carried into Sologne, about the begin-
“ ning of August; as knowing that they will
“ there meet with a great many fields of buck
“ wheat in flower, which will continue so till
“ about the end of September. His method
“ of transporting them is thus. His first care
“ is, to examine those hives, some of whose
“ honey-combs might be broken or sepa-
“ rated by the jolting of the vehicle: they
“ are made fast one to the other, and against
“ the sides of the hive, by means of small
“ sticks, which may be disposed differently
“ as occasion will point out. This being
“ done, every hive is set upon a packing-
“ cloth, or something like it, the threads of
“ which are very wide: the sides of this cloth
“ are then turned up, and laid on the outside
“ of each hive, in which state they are tied
“ together with a piece of small pack-thread
“ wound several times round the hive. As
“ many hives as a cart built for that purpose
“ will hold, are afterwards placed in this ve-
“ hicle. The hives are set two and two, the
“ whole length of the cart. Over these are
“ placed others; which make, as it were, a
“ second story or bed of hives. Those which
“ are stored with combs should always be
“ turned topsy-turvy. 'Tis for the sake of
“ their combs, and to fix them the better,
“ that they are disposed in this manner; for
“ such as have but a small quantity of combs

“ in

“ in them, are placed in their natural situation. Care is taken in this stowage, not to let one hive stop up another; it being essentially necessary for the bees to have air; and 'tis for this reason they are wrapped up in a coarse cloth, the threads of which were wove very wide, in order that the air may have a free passage, and lessen the heat which these insects raiſe in their hives; especially when they move about very tumultuously, as often happens in these carts. Those used for this purpose in Yévre, hold from thirty to forty-eight hives. As soon as all are thus stowed, the caravans set out. If the season is sultry, they travel only in the night; but a proper advantage is made of cool days. You'll imagine that they don't ride post. The horses must not be permitted even to trot; they are led slowly, and through the smoothest roads. When there are not combs in the hives sufficient to support the bees during their journey, the owner takes the earliest opportunity of resting them wherever they can collect wax. The hives are taken out of the cart, then set upon the ground, and after removing the cloth from over them, the bees go forth in search of food. The first field they come to serves them as an inn. In the evening, as soon as they are all returned, the hives are shut up; and being placed again in the cart,

“ cart, they proceed in their journey. When
“ the caravan is arrived at the journey’s end,
“ the hives are distributed in the gardens ;
“ or in fields adjacent to the houses of dif-
“ ferent peasants, who, for a very small re-
“ ward undertake to look after them. Thus
“ it is that, in such spots as do not abound
“ in flowers at all seasons, means are found
“ to supply the bees with food during the
“ whole year.”

THESE instances of the great advantages which attend shifting of bees in search of pasture, afford an excellent lesson to many places in this kingdom : they direct particularly the inhabitants of the rich vales, where the harvest for bees ends early, to remove their stocks to places which abound in heath, this plant continuing in bloom during a considerable part of the autumn, and yielding great plenty of food to bees. Those in the neighbourhood of hills and mountains will save the bees a great deal of labour, by taking also the advantage of shifting their places of abode.

OF ENEMIES TO BEES.

THE proprietor having provided for his bees as great plenty of pasture as he possibly can, should next be as careful to guard them from the many enemies which either annoy or seek to prey upon them. These are of three sorts. The first are weak harmless insects, which

which creep into a hive, without well knowing whither they are going, and only raise disturbances and confusion in it: the second endeavour to destroy the bees, and eat up their honey; and the mischief of the last is levelled only at their wax.

In the first class, we may reckon slugs and snails. Spiders seem hardly to deserve being ranked among the enemies to bees, because their webs are too weak to intangle a bee. Ants sometimes make their nests in the coverings of hives, without molesting or being molested. There is a little insect which adheres to bees, and probably lives by sucking their bodies. It is of a red colour, and of the size of a very small pin's head. It is usually found sticking to the breast of the bee. The young bees are never troubled with these lice, or vermin, which prey upon none but the old ones; nor have these generally more than one louse upon them. These lice are oftener found upon bees which inhabit old hives, where they have had time to multiply, than upon the tenants of a new one.

SEVERAL birds are numbered in the second class. Sparrows make great havock amongst bees, especially in the spring, in order to feed their young. Swallows are also mentioned in this light; but the fact does not seem to be well ascertained. Mr. Thorley speaks of ^a the tit-mouse, and the house-lark, a little dun bird

with a black bill; both great destroyers of bees. The only remedy here is, destroying the birds, and hiring boys to rob their nests. Hornets and wasps, and especially the species of wasps which are scarcely larger than bees, are very formidable enemies; for they seize a bee loaded with honey, kill him instantly, and suck out the honey. If this robbery is committed near the mouth of the hive, they carry off the bee to a place of greater safety. Their nests should therefore be carefully destroyed, by pouring plenty of boiling water into them; for this is by much the safest method. Columella advises ^b, that the hive have two or three openings at some distance from each other, to guard against the craft of the lizard, who, gaping for his prey, destroys the bees as they go forth.

THE field-mouse is an enemy to be carefully guarded against as soon as the cold begins to approach: for if it enters at that season it makes dreadful havock. At first it destroys the lowest parts of the combs; but as the weather grows colder, and the bees more torpid, it ascends up the hive, and seizes on the richest treasure: nor does the evil end here: for other bees, smelling the honey spilt by the mouse, fall upon the hive, and rob it of what remained; or as soon as the warm weather returns, and the bees stir about, they are

^b Lib. ix. c. 7.

sometimes so disgusted at the havock made by the mouse, that they desert the hive. The only way to guard against this, is to prevent its entering into a hive. Whilst the bees continue in their vigorous state, it dares not attack them: therefore, as soon as the cold approaches, the entrance to the hives should be lessened. The best way of effecting this, is, to have doors, if I may so call them, fitted to each hive. They may be made of pieces of wood flattened gradually to the ends, and rising in the middle, so that a passage may be cut in the under side, high enough for a bee to pass freely, that is to say, near half an inch high. This passage may be of any length thought proper; because it can easily be shortened, by thrusting in bits of wood at each end; or at such small distance from each other, that even the bees shall not be able to come out in the winter (which a sunny day often tempts them to do, to their own ruin) and yet air shall be admitted to them. Some advise to place perforated tin-plates before the door. If the hives are thatched, they should be examined from time to time, to see that none of these mice nestle in the thatch, through which they would by degrees eat themselves a passage into the hive.

BEES may themselves be reckoned enemies to bees: for they sometimes wage cruel wars against each other. Their fighting and plundering one another ought chiefly to be imputed,

ed, as Mr. Thorley observes ^c, either to their perfect abhorrence of sloth and idleness, or to their insatiable thirst for honey: for when, in spring or autumn, the weather is fair, but no honey can be collected from plants, and is to be found only in the hives of other bees, they will venture their lives to get it there.

DR. WARDER ^d assigns another cause of their fighting, which is, the necessity that the bees are reduced to when their own hive has been plundered, at a season when it is too late for them to repair the loss by any industry in the fields.

SOMETIMES one of the queens is killed in battle. In this case, the bees of both hives unite as soon as her death is generally known among them. All then become one people; the vanquished go off with the robbers, richly laden with their own spoils, and return every day, with their new associates, to pillage their old habitation. This causes a throng unusual for the season, at the door of the hive they are plundering; and if the owner lifts it up at night, when all are gone home, he will find it empty of inhabitants; though there perhaps will remain in it some honey, which he takes as his property.

WHEN two swarms take flight at the same time, they sometimes quarrel, and great numbers are destroyed on both sides, till one of

^c p. 126.

^d p. 96.

the

the queens is slain. This ends the contest, and the bees of both sides unite under the surviving sovereign.

ROBBERS make their attacks chiefly in the latter end of July and in the month of August. They appear to act with caution at first, and to procure themselves an entrance by stealth ; not pitching boldly like the native bees, and then entering at once in at the door. If they are encouraged by success, they return in greater parties, sometimes all the bees of a hive, and endeavour to force that entrance which they sought before with so much caution. They come in such numbers, as frequently to make those who are not acquainted with these scenes, mistake them for new swarms : but the number of dead bees strewed on the ground, soon convinces them of this error. Columella^e advises to kill the queen, if possible, (meaning undoubtedly that of the assailants) and to sprinkle them with mead, or some other sweet liquor ; for, says he, the sweetness being familiar to them, appeases their wrath. It may at least have this good effect ; that it will wet their wings, and, by its clamminess, deprive the bees of so free an use of them as they would otherwise have.

THE most effectual way to prevent the loss of bees, as well as of honey, occasioned by these robberies, is, early in the autumn to

^e Lib. ix. c. 9.

shorten

shorten the entrance into the hive, as before directed, so as to leave room for only two or three bees to pass a-breast. The bees will be much better able to defend this reduced entrance, than if it were larger. If, notwithstanding this narrowness of the passage, robbers attack a hive, the entrance should instantly be almost entirely shut up, and kept so till the thieves are gone; though many of the bees then out, and fighting in defence of their habitations, must be thereby sacrificed to the safety of the rest. The entrance should be again opened as soon as the coast is clear; and it will be adviseable in the evening to examine the state of the hive, especially as to weight, lest these plunderers should have been at it before, and thereby have brought it low. In this case, it will be better to take what remains, than to run the hazard of losing the whole: but if it feels heavy, the entrance should have only a passage for air, none for bees; and every crevice around the hive should be closed up with equal care, not only to guard against the attacks of their enemies, but to keep the bees themselves from going out. If but a few robbers appear, the bees of the hive should be put on their guard, by irritating them with some plant offensive to them; for they will instantly seize the robbers, and execute due vengeance on them. The person who is thus employed at a time when

all the bees are full of resentment, should himself be well defended from their stings.

IN the third class of enemies to bees is a small caterpillar, termed the wax-worm, or wax-moth, because of the havock it makes on wax. It is tender in its frame, unarmed and defenceless ; and yet can subsist itself in the midst, and at the cost, of the most numerous hive. A few of these little caterpillars will destroy and break to pieces the combs of a hive, build up new edifices for lodging themselves in it, and finally force the bees to quit the place.

THIS insect is of the species of the false-moth, and is extremely nimble. It is enough for it to get into a hive unawares. It runs so very swiftly, that it passes unperceived, and slides into some narrow place between the combs, perhaps inaccessible to bees, there to lay its eggs in security. This done, it makes its escape as well as it can. From each of these eggs proceeds a caterpillar, which escapes certain death merely by its extreme smallness, and the quickness with which it spins and enwraps itself in a covering sufficient to secure it from all harm. This covering, or tube, is glued to the wax which the caterpillar feeds on, and this insect lengthens the tube as it eats the wax, till at last it shuts itself up in order to be transformed into a chrysalis. Several caterpillars, and consequently several moths, must proceed from the eggs which the

males

males and females engender. Probably the bees destroy great numbers of the moths: however, if a single female has an opportunity to lay her eggs, she is so exceedingly prolific, that this second brood may quite overspread the hive. If one of the impregnated females escapes out of the hive by means of her great nimbleness, she seeks out another hive, in which she spreads the same source of mischief.

WHEN we consider how great damage this moth in particular, and other insects which frequently find means to creep into the hive, do to the combs of the bees; we shall find the Romans judged very rightly in cleaning their hives; of the manner of doing which, Columella speaks to the following purport ^f.

" THE hives should be first cured by opening them in the spring, in order that all the filth which has gathered in them during the winter, may be removed. Spiders, which spoil the combs, and these small worms, or rather caterpillars, from which the moths proceed, must be killed. During this operation, the smoak made by burning cow-dung mixed with a little grease, may be conveyed into the hive. When the hive has been thus cleaned, the bees will apply themselves to work with the greater diligence and resolution. From

^f Lib. ix. c. 14.

“ the summer solstice to the autumnal equinox, the hives should be opened, cleaned, and smoaked, every tenth day, and then washed and cooled with cold spring-water; and what impurities cannot be washed away, should be wiped off with the pinion of a sufficiently strong wing. Particular care must be taken to sweep out every caterpillar that can be seen, and to destroy all the moths. To this end, a vessel with a narrow neck increasing gradually to a wide mouth, with a light in the neck, should be placed under the hive, in the evening. The moths, gathering from all parts around this light, are, in that narrow space, scorched and killed. The hives must be carefully guarded in this season from robbers, and especially wasps, which lie in wait before the door, to watch the coming out of the bees.

“ ON the approach of winter, the hives should be again cleaned from all filth and noxious insects, because it is not proper to open them in the winter: and that this may be done the more effectually, a bright sun-shiny day should be chosen for it. If the hive is not sufficiently filled with combs, the vacuities in it should be filled up with some suitable substance, in order that, the void space being thereby reduced to a narrower compass, the bees may the more easily keep themselves warm during the winter.

" winter. The smallest crevices must now
" be carefully stopped up, and the hives be
" covered with straw, to shelter them from
" storms, even though they are in porticos."

*OF THE COMMON METHOD OF
TAKING THE HONEY AND WAX.*

HAVING given an account of the enemies to bees, I now proceed to their most inhuman one, man, who wantonly destroys greater numbers of them, than all the rest of their foes put together. Were we to kill the hen for her egg, the cow for her milk, or the sheep for the fleece it bears, every one would instantly see how much we should act contrary to our own interest: and yet this is practised every year in regard to bees. Would it not argue more wisdom in us, to be contented with taking away only a portion of their wax and honey, as is the practice of many countries? The common method here is, that when those which are doomed for slaughter have been marked out (which is generally done in September) a hole is dug near the hive, and a stick, at the end of which is a rag that has been dipped in melted brimstone, being stuck in that hole, the rag is set on fire, the hive is immediately set over it, and the earth is instantly thrown up all around, so that none of the smoak can escape. In a quarter of an hour, all the bees are seemingly dead;

and they will soon after be irrecoverably so, by being buried in the earth that is returned back into the hole: I say, they will soon be absolutely killed by this last means; because it has been found by experiment, that all the bees which have been affected only by the fume of the brimstone, recover again, excepting such as have been singed or hurt by the flame. Hence it is evident, that the fume of brimstone might be used for intoxicating the bees, with some few precautions. The heaviest and the lightest hives are alike treated in this manner; the former, because they yield the most profit, with an immediate return; and the latter, because they would not be able to survive the winter. Those hives which weigh from fifteen to twenty pounds are thought to be the fittest for keeping.

*OF THE METHOD PRACTISED BY
THE GREEKS AND ROMANS, FOR
TAKING THE WAX AND HONEY,
WITHOUT DESTROYING THE
BEEs.*

TH E following are the directions given by Columella^s for taking the wax and honey, in the more humane and judicious manner of saving the lives of the bees.

§ Lib. ix c. 15. See also Varro de Re rustica, lib. iii. c. 16.

“ CHOOSE

“ CHOOSE the early morning, before the
“ bees are stirring; for it is not proper to ex-
“ asperate them in the middle of the day:
“ have ready two knives, about a foot and an
“ half long; one with a cutting edge on each
“ side; the other of a curved form, with a
“ very sharp edge on one side only, and a
“ back fashioned for scraping. With the
“ former of these, cut down the combs; and
“ with the latter scrape off whatever frag-
“ ments may have been left. Have also ready
“ an earthen pot, with live coals in it, and
“ with a funnel-shaped cover, through which
“ the smell of galbanum, or of dried dung,
“ may be conveyed to any part of the hive,
“ in order to drive the bees from the combs
“ intended to be taken away.

“ THE first season for taking the combs is
“ when the bees are observed to expel the
“ drones. The combs always hang from
“ the roof of the hive, adhering but little to
“ the sides. In other respects, they are of
“ a shape fitted to the figure of the hive. At
“ the first time of taking the combs, only
“ one-fifth part of them need be left; because
“ the fields still continue to abound in food
“ for the bees: but at the second taking, about
“ the autumnal equinox, a third part should
“ be left, on account of the then approach-
“ ing winter. This, however, is not an in-
“ variable rule; for it should be altered ac-
“ cording to the nature of the seasons, and

“ the greater or less plenty of food in different situations. The combs are cut out with the cutting knife, and whatever fragments of them are left, may be pared off with the crooked knife. All the old combs, and such as are any way impaired by vermin or otherwise, should be taken away, as well as those that are full of honey. The combs which contain bee-bread, or young bees, should be left, the former for a supply of food, and the others for a recruit of young bees. The hive should be so placed when the combs are first cut, that the remaining combs may be easily come at when these last are also to be taken; for the older the combs are, the worse is the honey.

“ ALL the combs should then be carried into the place where the honey is to be separated from the wax; and particular care should be taken to stop every hole through which the bees might find admittance into this place, because they would otherwise be very troublesome during that operation. Dry dung may be kept burning at the door, to prevent their entrance there.

“ THE honey should be drained from the combs as soon as possible; and those combs which have young bees in them, or are any ways damaged, should be carefully parted from the rest, lest a bad flavour be communicated to the honey. The honey which

“ which flows freely should be kept by itself,
“ as being the purest and best.”

SOMEWHAT similar to this, but simpler, and so far better, is the method now practised in Greece, as related by Mr. Wheeler ^h, whose words I shall here give.

“ MOUNT Hymethus is celebrated for the
“ best honey in all Greece. We eat of it
“ very freely, finding it to be very good, and
“ were not at all incommoded with any grip-
“ ings after it. This mountain was not less
“ famous in times past for bees and admirable
“ honey; the antients believing that bees
“ were first bred here, and that all other bees
“ were but colonies from this mountain;
“ which if so, we assured ourselves that it
“ must be from this part of the mountain
“ that the colonies were sent; both because
“ the honey here made is the best, and that
“ here they never destroy the bees. It is of
“ a good consistence, of a fair gold-colour,
“ and the same quantity sweetens more water
“ than the like quantity of any other doth.
“ The natives wondered at my comrade, in
“ that he preferred the white honey of France;
“ telling him, that white honey is raw, and
“ not rightly concocted either by nature or
“ the bees. I no sooner knew that they
“ never destroy or impair the stock of bees in

^h A Journey into Greece, by George Wheeler, Esq; in Company with Dr. Spon of Lyons, p. 411.

“ taking away their honey, but I was inquisitive to understand their method of ordering the bees; which being an art so worthy the knowledge of the curious, I shall not think it beside the purpose, to relate what I saw, and was informed to that effect, by such as had skill in that place.

“ THE hives they keep their bees in are made of willows or osiers, fashioned like our common dust-baskets, wide at top and narrow at the bottom, and plastered with clay or loam within and without. They are set as in *Pl. 1. Fig. 4.* with the wide end upmost. The tops are covered with broad flat sticks, which are also plastered over with clay; and to secure them from the weather, they cover them with a tuft of straw, as we do. Along each of these sticks, the bees fasten their combs; so that a comb may be taken out whole, without the least bruising, and with the greatest ease imaginable. To increase them in spring time, that is in March or April, until the beginning of May, they divide them; first separating the sticks on which the combs and bees are fastened, from one another, with a knife: so taking out the first comb and bees together on each side, they put them into another basket, in the same order as they were taken out, until they have equally divided them. After this, when they are both again accommodated with sticks and

“ plaster,

“ plaister, they set the new basket in the place
“ of the old one, and the old one in some
“ new place. And all this they do in the
“ middle of the day, at such time as the
“ greatest part of the bees are abroad ; who
“ at their coming home, without much dif-
“ ficulty, by this means divide themselves
“ equally. This device hinders them from
“ swarming and flying away. In August they
“ take out their honey, which they do in the
“ day time also, while they are abroad ; the
“ bees being thereby, say they, disturbed least :
“ at which time they take out the combs
“ laden with honey, as before ; that is, be-
“ ginning at each outside, and so taking away,
“ until they have left only such a quantity of
“ combs, in the middle, as they judge will
“ be sufficient to maintain the bees in winter ;
“ sweeping those bees that are on the combs
“ into the basket again, and again covering
“ it with new sticks and plaister.

“ ALL that I doubt concerning the prac-
“ tice of this here in England, is, that per-
“haps the bees gather a less quantity of honey
“ in this country ; and that, should we take
“ from them a like proportion of it, they
“ would not have enough left to preserve
“ them in winter. But this hinders not
“ much : for by being less covetous, and not
“ taking so much honey from the poor bees,
“ the great increase and multiplying of them
“ would soon equalize, and far exceed the
“ little

“ little profit we have by destroying them.
“ This is done without the smoke of sulphur,
“ which takes away very much of the fra-
“ grance of the wax: and sure I am, that
“ the honey can receiye neither good taste,
“ nor good smell, from it.”

Mr. WHEELER likewise informs us, that whilst he was viewing the beauties of Parnassus, he enjoyed the sweets of a repast of honey thus easily come at. “ After I had discoursed some time,” says heⁱ, “ with the good old Caloyer (Priest), whom they esteemed a saint, I was conducted into a garden well planted with beans and peas (this was at the end of January), and another by it furnished with four or five hundred stocks of bees. The good old Caloyer presently went, took a stock of bees, and brought me of delicate white honey-combs, with bread and olives, and very good wine; to which he sat us down in his hut, and made us a dinner, with far greater satisfaction than the most princely banquet in Europe could have afforded us.”

THAT the number of our hives might be greatly increased wherever there is proper pasture for bees, appears evidently from Mr. Wheeler’s narrative, and is confirmed by the following passage in the account lately published of the sheep in Spain.

" IF sheep loved aromatic plants, it would
" be one of the greatest misfortunes that
" could befall the farmers in Spain. The
" number of bee-hives there is incredible.
" I am almost ashamed to give under my
" hand, that I knew a parish-priest who had
" five thousand hives. The bees suck all their
" honey, and gather all their wax, from the
" aromatick flowers, which enamel and per-
" fume two-thirds of the sheep-walks. This
" priest cautiously seizes the queens in a small
" crape fly-catch, and then clips off their
" wings, after which their majesties stay at
" home: he assured me, that he never lost a
" swarm from the day of this discovery, to
" the day he saw me, which was, I think,
" five years after."

THE Greek method, which Mr. Wheeler relates, of sharing the honey with the bees, has been lately introduced into France, as we are informed by Mess. de Réaumur and Du Hamel. The latter gives the following account of it, in the memoirs of the royal academy of sciences, for the year 1754^k.

" M. PRROUTEAU made great improve-
" ments in the management of bees. I took
" a singular pleasure in being, from time to
" time, an eye-witness of the progress of his
" researches, and in admiring the success of

" his industry. I took notes of what I saw,
" and communicated them to M. de Réau-
" mur, who has added them to his own very
" interesting observations on bees. The me-
" thods practised by M. Prouteau have rendered
" our province of Gatinois somewhat famous.

“ M. PROUTEAU is dead ; but the taste for
“ rearing bees has increased. This spirit of
“ inquiry being continued, several successful
“ trials have been made, and particularly by the
“ Sieur Desbois at Pethiviers, who excels in
“ the management of these little animals.
“ He has devised new methods of practice,
“ which are adopted by all who rear bees.

" IT is true, that the first hints of these
" practices may be found in M. de Réau-
" mur's works : but it is right to inform the
" public, that they are executed in an ex-
" tensive manner, and with success ; were it
" only to refute the prejudice of those who
" lay to the charge of inquirers into nature,
" that their pursuits are only matters of mere
" curiosity and amusement.

“ To shew in their order the discoveries
“ that have been made in this province, I
“ shall here run over the different operations
“ which succeed one another during the course
“ of a year.

“ season to alight on the bark of resinous
“ trees, from whence they are thought to ga-
“ ther the propolis. They are permitted to
“ indulge themselves peaceably in these oc-
“ cupations, till the coming out of the first
“ swarms, which generally lasts from the
“ 20th of May to the 20th of June.

“ THEIR swarming is watched with great
“ vigilance, and all possible care is taken to
“ put both the strong and the weak swarms
“ into hives. The strong ones form good
“ hives; and the weak ones serve to strengthen
“ those which stand in need of their assistance,
“ as I shall hereafter explain: for the greatest
“ part of the art of managing these insects
“ consists in keeping the hives always well
“ stocked with bees; these being so many
“ labourers which work with surprising acti-
“ vity to enrich their master:

“ As the swarms or casts which come in
“ July are small, they should always be made
“ use of to strengthen weak hives; though
“ many, without troubling themselves about
“ these little swarms, shift their bees from
“ one hive into another, from the very be-
“ ginning of July, in order to possess them-
“ selves of all the wax, and all the honey,
“ which they have amassed in great quantity
“ from off the spring flowers. The manner
“ of performing this operation is thus:

“ ONE or two openings are made at the
“ top of the hive intended to be emptied; by

“ cutting down the osiers which run cross-wise, and sparing as much as possible those which run length-wise, in order that it may be repaired after it has been emptied, by weaving in new osiers. This hive is then placed on the back of a chair, the end of which is rested on a bench, and the hive into which the bees are to be driven is set over that other hive.

“ To prevent the bees from escaping between the hives, these are wrapped up in a large cloth tied round with a cord. An earthen pot with live-coals in it, covered with a few linen-rags, to make a great deal of smoke, is put under the chair, that the smoke may get into the full hive. The bees, incommoded by the smoke, ascend to the top, and finding there an opening, go into the empty hive, to avoid that nuisance. When it is supposed that they are all got into the upper hive, this is gently lifted off, and set upon the ground, and the full hive is carried away quickly.

“ It is well known, that the propagation of their species is what the bees have most of all at heart. Take away their provisions, which they have been at infinite pains to amass, and they will procure themselves a new store: but if their brood is taken from them, the discouragement is sensible, and nothing but the hope of seeing their queen lay eggs anew can determine them

“ to

" to return to their labours. Accordingly, it
" is observed, that when the brood is pre-
" served in changing the hives, the activity is
" much greater than when the bees are de-
" prived of them.

" To explain the manner in which the
" young are preserved, it is necessary to pre-
" mise, that the smoke of rags intoxicates the
" bees in some degree, from which they gra-
" dually recover. While they are in that
" state, the combs are taken out of the hive
" from which the bees have been driven, and
" such of them as are full of honey are set
" apart for the profit of the owner, who takes
" great care not to damage those which con-
" tain the young, and replaces them quite at
" the top of a new hive, where they are sup-
" ported by sticks run across. This hive is
" placed near to that in which the bees were
" left; and upon giving this last a smart
" stroke with the hand, the bees in it fall to
" the ground, where they are instantly cov-
" ered with that in which the combs with
" the young brood were fixed. The bees,
" soon recovering, ascend into this hive, where,
" finding their young, they set to work with in-
" credible alacrity to repair their losses: they
" soon fasten the combs with their young off-
" spring either to the hives, or to the sticks:
" the nymphs that have been killed in the
" course of this operation are taken out of the
" cells, which are then filled with honey; new

“ combs are immediately set about; the remaining nymphs soon become bees; and by this increase of the number of labourers, the cells are quickly filled with honey. That this may be the more speedily accomplished, the bees are removed to places where they find plants still in bloom. Of this kind are heath, melilot, broom, sea-rushes, vetches, buck-wheat, wild mustard, or charlock growing in too great plenty in corn fields, and especially the *virga aurea Virginiana Zanoni*, which our peasants call bastard-hemp.

“ IF the weather is favourable, and there is plenty of flowers, the hives that were first changed are well filled towards the end of August. When that is the case, they are emptied a second time; still with the same care of their young: and as it is of the highest importance that the hives be always well stocked with bees, it is at this time found necessary to strengthen some hives, by uniting the bees of two hives into one.

“ WHEN it is intended to unite the bees of two hives, one of them is fumigated as before, so as to force the bees into an empty hive. Being then struck to the ground, they are covered with the hive which is to receive this reinforcement. The strange bees mingle with the others, and form one family, generally without much contention;

" tion ; though sometimes there arises a quar-
" rel which costs the lives of many bees ; and
" it is thought that these hostilities do not
" cease till one of the mothers has been kill-
" ed !. If there be several weak hives, and
" none of the others stand in need of being
" re-inforced, two or three of the weak ones
" may be united together ; for in this state
" they often turn out very profitable.

" As soon as the hives have been changed
" a second time, they are carried into the
" neighbourhood of a field of buck-wheat,
" to enable the bees to collect a third store ;
" and in a favourable season for working,
" when there is not either much rain or
" stormy wind, and the flowers blow well,
" the hives are so well filled by the end of
" September, that near half a foot of the
" combs may be pared off. This operation
" requires few precautions : the hive is laid
" on a chair a little inclined, and the bees
" are forced to retire to the top of the hive,
" by blowing in smoke between the combs,
" which are then cut without the least dis-
" turbance from the bees.

" It is almost needless to say that the
" hives should not be changed again, unless
" they are very heavy, and well stocked with
" bees. And even if they are, the hazard

¹ It would therefore be prudent to kill one of the mothers when the bees are struck down upon the ground ; since this would prevent any future animosity.

“ of their not recruiting their loss, in this
“ late season of the year, should not be ven-
“ tured for the inconsiderable profit they
“ would yield: for the honey which is col-
“ lected from buck-wheat is always yellow,
“ and of little value.

“ IN the beginning of October, the hives
“ should be visited, or rather weighed by
“ hand, in order to give honey to the bees
“ of such as are light, and therefore judged
“ not to have a sufficiency of provision for
“ the winter; a subject which will be spoken
“ of hereafter. But in the mean time I
“ ought not here to pass over in silence a fact
“ which none of us could account for:

“ HAVING visited our hives this autumn,
“ to see which of them would want help, we
“ found one very light, and judged that six
“ pounds of honey should be given to this
“ hive. Four or five days after, when this hive
“ was lifted up, in order to put the plate of ho-
“ ney under it, it was found to be very heavy,
“ without its being possible to conceive how,
“ in so advanced a season, the bees could have
“ collected so much. We suspected that they
“ had plundered some neighbouring hive:
“ but if they did, they must have gone a
“ great way for it; there not being any hives
“ near that had been robbed.

“ THE nature of the seasons has a great ef-
“ fect on the labour of the bees, with regard
“ to their success; and of this the proprietor
“ should

“ should be able to judge: for though their
“ hives may be changed three times in fa-
“ vorable years; the seasons may be such
“ in other years, that they cannot be changed
“ more than once. This difference should
“ also be attended to in choosing their pas-
“ ture: for instance, if the summer is wet,
“ shady and watery places should be avoided,
“ because there the bees themselves would be
“ in danger of being destroyed by the wa-
“ teriness of the honey. On the other hand,
“ these are the best situations in dry years,
“ when all the flowers are parched up in
“ places exposed to the sun. Sudden and un-
“ foreseen changes may deceive the most in-
“ telligent husbandman; and in that case he
“ should give his bees a supply proportioned
“ to their exigencies.

“ It sometimes happens that when some
“ hives are quite full of honey, we find others
“ almost empty. We call these last *degene-*
rated hives, the bees of which work only
“ to live. This inaction of the bees is gene-
“ rally a sign that their queen is dead. In
“ this case, if the hive is weak in bees, it is
“ added to a strong one; but if it is strong
“ in bees, a weak hive is added to it: or an
“ old hive may be examined, to see whether
“ there be not in it a young queen to spare;
“ by this means the activity of the bees is ge-
“ nerally restored. Some hives degenerate
“ when full of combs and honey: not for

“ want of a queen ; but because the bees,
“ content with their store, indulge them-
“ selves in idleness. In this case, they may
“ be put into another hive, if the season is
“ yet favourable ; or the combs may be cut
“ off to within four or five inches of the top
“ of the hive. If they are not set to work
“ by these means, it is a sure sign that the
“ queen is dead.

“ I SHALL close this account with the re-
“ lation of a fact which happened to a cler-
“ gyman in the neighbourhood of Pethiviers.
“ He set a well stocked hive of bees upon a
“ tub turned bottom up, after having made
“ a hole through that bottom. The bees
“ made in this tub combs so large, that their
“ cells resembled quills. It contained near
“ six pounds of wax, and four hundred and
“ twenty pounds of honey. This was a great
“ deal : for our best hives weigh but from
“ eighty to an hundred pounds, and contain
“ only from two pounds to two pounds and
“ an half of wax, and about seventy pounds
“ of honey.”

*OF THE IMPROVED METHODS OF
TAKING THE HONEY AND WAX
WITHOUT DESTROYING THE
BEEs.*

ATTEMPTS have been made in our own country, to attain the desirable end of getting the honey and wax without destroying the bees. John Geddy, Esq; published in the year 1665 his invention of boxes for preserving the lives of bees. These were improved by Joseph Warder, Physician, at Croydon, who at the same time embellished his account of the structure and use of these boxes, with several other curious circumstances concerning bees, in his work intituled *The true Amazons, or the Monarchy of Bees*. Two very worthy clergymen, the reverend Mr. John Thorley of Oxford, and the reverend Mr. Stephen White, M.A, Rector of Holton in Suffolk, have brought the method of preserving the lives of bees to still greater perfection. I shall relate the opinions and practice of each, beginning with Mr. Thorley, who lived many years before Mr. White, and mix their accounts with the best improvements that have been lately made in foreign countries.

MR. THORLEY, in his *Enquiry into the Nature, Order, and Government of Bees*^m, thinks

^m P. 139.

colonies preferable to hives, for the following reasons. *First*, the more certain preservation of very many thousands of these noble and useful creatures: *Secondly*, their greater strength (which consists in numbers) and consequently their greater safety from robbers: *Thirdly*, their greater wealth, arising from the united labours of the greater number. He tells usⁿ that he has in some summers taken two boxes filled with honey from one colony; and yet sufficient store has been left for their maintenance during the winter; each box weighing forty pounds. Add to these advantages, the pleasure of viewing them; with the greatest safety, at all seasons, even in their busiest time of gathering, and their requiring a much less attendance in swarming time. The bees thus managed are also more effectually secured from wet and cold, from mice and other vermin.

His boxes are made of deal, which, being spungy, sucks up the breath of the bees sooner than a more solid wood would do. Yellow dram-deal thoroughly seasoned is the best.

AN octagon, being nearer to a sphere, is better than a square form; for as the bees, in winter, lie in a round body near the centre of the hive, a due heat is then conveyed to all the out-parts, and the honey is kept from candying.

ⁿ P. 140.

THE dimensions which Mr. Thorley, after many years experience, recommends for the boxes are ten inches depth, and twelve or fourteen inches breadth, in the inside^o. He has tried boxes containing a bushel or more, but found them not to answer the design like those of a lesser size. The larger are much longer in filling; so that it is later ere you come to reap the fruits of the labour of the bees; nor is the honey there so good and fine; the effluvia even of their own bodies tainting it.

THE best and purest honey is that which is gathered in the first five or six weeks: and in boxes of less dimensions you may take in a month or little more, provided the season be favourable, a box full of the finest honey.

THE top of the box^p should be made of an entire board, a full inch thick after it has been planed, and it should project on all sides at least an inch beyond the dimensions of the box. In the middle of this top there must be a hole five inches square, for a communication between the boxes; and this hole should be covered with a sliding shutter, of deal or elm, running easily in a groove over the back window. The eight pannels, nine inches deep, and three quarters of an inch thick when planed, are to be let into the top so far as to keep them in their proper places; to be secured

^o P. 141. ^p P. 142.

at the corners with plates of brass, and to be cramped with wires at the bottom, to keep them firm: for the heat in summer will try their strength. There should be a glass window behind, fixed in a frame, with a thin deal cover, two small brass hinges, and a button to fasten it. This window will be sufficient for inspecting the progress of the bees. Two brass handles, one on each side, are necessary, to lift up the box: these should be fixed in with two thin plates of iron, near three inches long, so as to turn up and down, and put three inches below the top-board, which is nailed close down with sprigs to the other parts of the box.

THOSE who chuse a frame within, to which the bees may fasten their combs, need only use a couple of deal sticks of an inch square, placed a-cross the box, and supported by two pins of brass; one an inch and half below the top, and the other two inches below it; by which means the combs will quickly find a rest. One thing more, which perfects the work, is, a passage, four or five inches long, and less than half an inch deep, for the bees to go in and out at the bottom of the box.

P Dr. Warder makes the top of the box eighteen inches over; the pannels seven inches and a quarter wide on the outside, and six and three quarters in the inside; and the diameter of the box seventeen inches. *Monarchy of Bees*, p. 123.

*OF THE MANAGEMENT OF
BEE-S IN COLONIES.*

IN keeping bees in colonies, an house is necessary, or at least a shed; without which the weather, especially the heat of the sun, would soon rend the boxes to pieces.

YOUR house may be made of any boards you please, but deal is the best. Of whatever sort the materials are, the house must be painted, to secure it from the weather.

THE length of this house, we will suppose for six colonies, should be full twelve feet and an half, and each colony should stand a foot distance from the other. It should be three feet and an half high, to admit four boxes one upon another; but if only three boxes are employed, two feet eight inches will be sufficient. Its breadth in the inside should be two feet. The four corner posts should be made of oak, and well fixed in the ground, that no stormy winds may overturn it, and all the rails should be of oak, supported by several uprights of the same, before and behind, that they may not yield or sink under six, seven, or eight hundred weight, or upwards. The floor of the house (about two feet from the ground) should be strong and smooth, that the lowest box may stand close to it.

THIS floor may be made with boards or planks of deal the full length of the bee-house;

house; or, which is preferable, with a board or plank to each colony, of two feet four inches long, and fixed down to the rails; and that part which appears at the front of the houses may be cut into a semi-circle, as a proper alighting place for the bees. Plane it to a slope, that the wet may fall off. When this floor to a single colony wants to be repaired, it may easily be removed, and another be placed in its room, without disturbing the other colonies, or touching any other part of the floor.

UPON this floor, at equal distances, all your colonies must be placed, against a door or passage cut in the front of the house.

ONLY observe farther, to prevent any false step, that as the top-board of the box (being a full inch, broader than the other part) will not permit the two mouths to come together, you must cut a third in a piece of deal of a sufficient breadth, and place it between the other two, so close, that not a bee may get that way into the house. And fixing the said piece of deal down to the floor with two lath nails, you will find afterwards to be of service, when you have occasion either to raise a colony, or take a box of honey, and may prove a means of preventing a great deal of trouble and mischief.

THE house being in this forwardness you may cover it to your own mind, with boards, fine slates, or tiles. But contrive their position

tion so as to carry off the wet, and keep out the cold, rain, snow, or whatever might any way prejudice and hurt them.

THE back-doors may be made of half-inch deal, two of them to shut close in a rabet, cut in an upright pillar, which may be so contrived, as to take in and out, by a mortise in the bottom rail, and a notch in the inside of the upper rail, and fastened with a strong hasp. Place these pillars in the spaces between the colonies.

CONCLUDING your house made after this model, without front doors, a weather-board will be very necessary to carry the water off from the places where the bees settle and rest.

GOOD painting will be a great preservative. Forget not to paint the mouths of your colonies, with different colours, as red, white, blue, yellow, &c. in form of a half-moon, or square, that the bees may the better know their own home. Such diversity will be a direction to them.

THUS your bees are kept warm in the coldest winter; and in the hottest summer greatly refreshed by the cool air, the back-doors being set open, without any air-holes made in the boxes.

DR. WARDER observes ^q, that in June, July, and August, when the colonies come to be very full, and the weather proves very hot,

^q Monarchy of Bees, p. 128.

the appearance of a shower drives the bees home in such crouds, that presling to get in, they stop the passage so close, that those within are almost suffocated for want of air; which makes these last so uneasy, that they are like mad things. In this extremity, he has lifted the whole colony up a little on one side, and by thus giving them air, has soon quieted them. He has known them, he says, come pouring out, on such an occasion, in number sufficient to have filled at once two or three quarts; as if they had been going to swarm. To prevent this inconvenience, he advises cutting a hole two inches square in about the middle of one of the hinder pannels of each box. Over this hole, nail, in the inside of the box, a piece of tin-plate punched full of holes so small that a bee cannot creep through them; and have over it, on the outside, a very thin slider, made to run in grooves; so that, when it is thrust home, all may be close and warm; and when it is opened, in very hot weather, the air may pass through the holes, and prevent the suffocating heat. Or holes may be bored in the pannels themselves, on such an emergency, in a colony already settled.

Such a thorough passage for the air may be very convenient in extreme heat, which is sometimes so great as to make the honey run out of the combs. The Memoirs of the truly laudable Berne Society, for the year 1764, give us a particular instance of this, when they

say^r, that, in 1761, many in Switzerland were obliged to smother their bees, when they saw the honey and wax trickling down; not knowing any other remedy for the losses they daily sustained. Some shaded their hives from the sun, or covered them with cloths wet several times a-day, and watered the ground all around.

THE best time to plant the colonies is^s, either in spring with new flocks full of bees, or in summer with swarms. If swarms are used, procure, if possible, two of the same day; hive them either in two boxes, or in a hive and a box; at night place them in the bee-house, one over the other, and, with a knife and a little lime and hair, stop close the mouth of the hive, or upper box, so that not a bee may be able to go in or out, but at the front door. This done, you will, in a week or ten days, with pleasure see the combs appear in the boxes; but if it be an'hive, nothing can be seen till the bees have wrought down into the box^t. Never plant a colony with a single swarm, as Mr. Thorley says he has sometimes done, but with little success.

WHEN the second box, or the box under the hive, appears full of bees and combs, it is time to raise your colony. This should be

^r P. 116. ^s Thorley, p. 146. ^t Mr. Thorley (the son) puts a glass in straw hives, and thereby renders them equally convenient for looking at.

done

done in the dusk of the evening, and in the following manner.

PLACE your empty box, with the sliding shutter drawn back, behind the house, near the colony that is to be raised, and at nearly the height of the floor; then lifting up the colony with what expedition you can, let the empty box be put in the place where it is to stand, and the colony upon it, and shut up the mouth of the then upper box, with lime and hair as before directed.

WHEN, by the help of the windows in the back of the boxes, you find the middle box full of combs, and a quantity of honey sealed up in it, the lowest box half full of combs, and few bees in the uppermost box, proceed thus^u.

ABOUT five o'clock in the afternoon, drive close, with a mallet, the sliding shutter under the hive or box that is to be taken from the colony. If the combs are new, the shutter may be forced home without a mallet; but be sure it be close, that no bees may ascend into the hive or box to be removed. After this, shut close the doors of your house, and leave the bees thus cut off from the rest of their companions, for the space of half an hour or more. In this space of time, having lost their queen, they will fill themselves with honey, and be impatient to be set at liberty.

^u Thorley, p. 148.

IF, in this interval, you examine the box or boxes beneath, and observe all to be quiet in them, you may be confident that the queen is there, and in safety. Hereupon raise the back part of the hive or box so far, by a piece of wood slipped under it, as to give the prisoners room to come out, and they will return to their fellows: then lifting the box from off the colony, and turning it bottom upmost, cover it with a cloth all night; and the next morning, when this cloth is removed, the bees that may have remained in it will return to the colony. Thus you have a hive or box of honey, and all your bees safe^u.

IF the bees do not all come out in this manner, Dr. Warder's^w method may be followed, especially if it be with a hive. It is, to place the hive with the small end downward in a pail, peck, or flower-pot, so as to make it stand firm: then to take an empty hive, and set it upon the former, and to draw a cloth tight round the joining of the two hives, so that none of the bees may be able to get out: after this, to strike the full hive so smartly as to disturb the bees that are in it,

^u By leaving the box or hive out all night, with its bottom upmost, the honey will be considerably thickened, especially if the night happens to be cold. I therefore think it more adviseable to drain the honey off as soon as possible, after the box or hive has been taken from the colony; as is directed by Columella. ^w Monarchy of Bees, p. 145.

but with such pauses between the strokes as to allow them time to ascend into the empty hive, which must be held fast whilst this is doing, lest it fall off by the shaking of the other. When you perceive by the noise of the bees in the upper hive, that they are got into this last, carry it to a cloth spread for this purpose before the colony, with one end fastened to the landing-place, and knock them out upon it: they will soon crawl up the cloth, and join their fellows, who will gladly receive them.

MR. THORLEY next gives * an account of his narcotic, and of the manner of using it.

THE method which he has pursued with great success, for many years, and which he recommends to the public, as the most effectual for preserving bees in common hives, is incorporation, or uniting two stocks into one, by the help of a peculiar fume or opiate, which will put them entirely in your power for a time, to divide and dispose of at pleasure. But as that dominion over them will be of short duration, you must be expeditious in this business.

THE queen is immediately to be searched for, and killed. Hives which have swarmed twice, and are consequently reduced in their numbers, are the fittest to be joined together, as this will greatly strengthen and im-

* Enquiry into the Nature, &c. of Bees, p. 151.

prove them. If a hive which you would take is both rich in honey, and full of bees, it is but dividing the bees into two parts, and putting them into two boxes, instead of one. Examine whether the stock to which you intend to join the bees of another, have honey enough in it to maintain the bees of both: it should weigh full twenty pounds.

THE narcotic, or stupefying fume, is made with the *fungus maximus* or *pulverulentus*, the large mushroom, commonly known by the name of bunt, puckfist, or frog-cheese. It is as big as a man's head, or bigger: when ripe, it is of a brown colour, turns to powder, and is exceeding light. Put one of these pucks into a large paper, press it therein to two-thirds or near half the bulk of it's former size; and tie it up very close; then put it into an oven some time after the household bread has been drawn, and let it remain there all night: when it is dry enough to hold fire, it is fit for use. The manner of using it is thus:

CUT off a piece of the puck, as large as a hen's egg, and fix it in the end of a small stick slit for that purpose, and sharpened at the other end, which place so that the puck may hang near the middle of an empty hive. This hive must be set with the mouth upward, in a pail or bucket which shall hold it steady, near the stock you intend to take. This done, set fire to the puck, and imme-

diate place the stock of bees over it, tying a cloth round the hives, that no smoke may come forth. In a minute's time, or little more, you will hear the bees fall like drops of hail into the empty hive. You may then beat the top of the full hive gently with your hand, to get out as many of them as you can: after this, loosing the cloth, lift the hive off to a table, knock it several times against the table, several more bees will tumble out, and perhaps the queen among them. She often is one of the last that falls. If she is not there, search for her among the main body in the empty hive, spreading them for this purpose on a table.

You must proceed in the same manner with the other hive, with the bees of which these are to be united. One of the queens being secured, you must put the bees of both hives together, mingle them thoroughly, and drop them among the combs of the hive which they are intended to inhabit. When they are all in, cover it with a packing or other coarse cloth which will admit air, and let them remain shut up all that night and the next day. You will soon be sensible that they are awaked from this sleep.

THE second night after their union, in the dusk of the evening, gently remove the cloth from off the mouth of the hive, (take care of yourself) and the bees will immediately sally forth with a great noise; but being

ing too late, they will soon return: then inserting two pieces of tobacco pipes to let in air, keep them confined for three or four days, after which the door may be left open.

THE best time of the year for uniting bees is after their young brood are all out, and before they begin to lodge in the empty cells. As to the hour of the day, he advises young practitioners to do it early in the afternoon, in order that, having the longer light, they may the more easily find out the queen. He never knew such combined stocks conquered by robbers. They will either swarm in the next summer, or yield an hive full of honey.

Mr. N. THORLEY, son of the above-mentioned clergyman, has added to the edition which he has given of his father's book, a postscript purporting that persons y who chuse to keep bees in glaſs hives may, after uncovering the hole at the top of a flat-topped straw hive, or box, place the glass over it, so close that no bees can go in or out but at the bottom of the hive or box. The glass hive must be covered with an empty hive, or with a cloth, that too much light may not prevent the bees from working. As soon as they have filled the straw hive or box, they will begin to work up into the glass hive. He tells us, that he himself has had one of these glaſs hives filled by the bees in thirty days, in a fine season,

and that it contained thirty-eight pounds of fine honey. When the glass is completely filled, slide a tin-plate between it and the hive or box, so as to cover the passage, and in half an hour the glass may be taken off with safety. What few bees remain in it, will readily go to their companions. He then very obligingly offers his service and farther information to any gentleman or lady whose curiosity may incline them to inspect his apiary. He has added a glass window to his straw hives, in order to see what progress the bees make; which is of some importance, especially if one hive is to be taken away whilst the season still continues favourable for their collecting of honey; for when the combs are filled with honey, the cells are sealed up, and the bees forsake them, and reside mostly in the hive in which their works are chiefly carried on. Observing also that the bees were apt to extend their combs through the passage of communication into the upper hive, whether glass or other, which rendered it necessary to divide the comb when the upper hive was taken away, he now puts in that passage a wire screen, or netting, the meshes of which are large enough for a loaded bee to go easily through them. This prevents the joining of the combs from one box to the other, and consequently obviates the necessity of cutting them, and of spilling some of the honey, which, running down amongst a crowd of bees, used before

to incommodate them much; it being difficult for them to clear their wings of it. *Fig. 5, (Pl. 1,) is a drawing of one of his colonies.*

OF THE MANAGEMENT OF BEES IN HIVES.

THE Society which the States of Brittany have established for the improvement of Agriculture, Arts, and Commerce, constantly distinguished by the regularity and judgment which attend all their steps, have proceeded admirably in regard to bees^z. They began with procuring information of what has been hitherto done to preserve the lives of those useful creatures, and at the same time increase the quantity of wax, their principal object. Count de la Bourdonnaye took upon himself not only the making of this inquiry, but also the conducting of such experiments as might be necessary to ascertain the true merit of each method proposed.

IN their Memoirs for the years 1759 and 1760, we are informed^a, that the Count preferred the following, on account of the success with which it was attended, and also for its cheapness, which, as they justly observe,

^z Corps d'Observations de la Société d'Agriculture, de Commerce, et des Arts, établie par les Etats de Bretagne. Années 1757 et 1759, p. 162. ^a p. 237.

is a most important point in whatever relates to the management of rural affairs. As this method bears a near resemblance to Mr. Thoreley's, I shall here subjoin it to his account.

COUNT DE LA BOURDONNAYE's hives are made of straw, divided into two parts, which are placed one over the other. Each of these parts is twelve Paris inches* in diameter in the inside, and eleven inches high; so that, when joined, they make an hive twenty-two inches in height. They are nearly flat on the top, and have in the middle of the top a hole an inch and a quarter square. The upper half rests on the lower. They are made of sufficient thickness to be proof against cold, and not to be heated by the rays of the sun. When united, their joining is luted close.

WHEN the bees have filled the upper half, the combs are necessarily interrupted by the intermediate bottom; and this, perhaps, induces them to fill that half more completely than they would do if they met not with such a stop. When both parts are full, which may be known by the bees wanting room, the upper half is taken away, and as soon as it has been emptied, it is put under the remaining full half.

WHILST the bees are filling the lower half of the hive, the eggs laid in the upper half

* The Paris foot is to the English foot, as $12 \frac{7}{16}$ inches are to 12 inches.

become bees: and as the queen deposits her eggs as near the entrance as can be done with safety to the young, she never lays any in the upper half, after it is become the upper half; but as fast as the bees are perfected there, the cells are filled with honey. By this means none of the young brood are lost, and almost the whole of what is taken consists of honey and wax.

THE hives stand separate, and at a distance from walls^c. No plants are suffered to rise high near them; and the stool is raised so high from the ground, that mice, their very dangerous enemies, cannot jump up to it.

OF THE MANAGEMENT OF BEES IN BOXES.

A Very ingenious and attentive lady in Swisserland has published, in the Memoirs of the Berne Society for the year 1764^d, extremely judicious observations on bees and hives, particularly those which are added one to another in the manner above described. Her remarks well deserve our attention. I shall therefore give here her own account of them^e.

^c p. 240. ^d Mémoires et Observations receuilles par la Société Oeconomique de Berne. Année 1764, Part I. p. 95. ^e Observations sur les Abeilles, par Madame Vicat, née de Curtas, Epouse de M. Vicat, Professeur en Droit à Lausanne.

ON the 9th of June 1761, this lady bought an hive of bees, in a straw hive. The combs were emptied of their honey, and thereby rendered the more liable to be attacked by the moth. She placed it in a little garden in the heart of the city of Lausanne. She soon discovered that there were moths in it, and that the bees had lice on them; which determined her to place a glass hive over the straw one, and to shut up the opening into the lower hive. She frequently looked into the glass hive, to see what passed in it. The bees never stopped in it, and it served only as a thoroughfare to the straw hive. The bees, though very laborious and numerous, could not defend themselves against the moths, which multiplied daily: On the 18th of July her bees were reduced to little more than three hundred. Finding their number decrease every day, she suspected that some accident had happened to the queen, which upon examination she found to be true; as she also did, that these moths may soon destroy the most numerous hive. They had mouldered away the wax, and had united the three middle combs, by their galleries, to such a degree, that they appeared but as one mass. Upon turning up the hive, to see what condition it was in, she found the sides covered with white and hard cocoons, which would soon produce moths. They were in such quantity as to fill the crown of her hat.

IT appears to her that the moths are most ready to attack hives which have swarmed oftener than once; because in them the combs, in which the young bees were reared, being empty, serve for both shelter and food to their maggots, which feed only on wax. For the same reason, late swarms, and hives in which there is not much honey, are equally exposed to these insects. Such hives should therefore be cleaned at least once a week. If moths are found on the stool of the hive, it should be cleaned every morning. In order to do this the more easily, without disturbing the bees, or running the hazard of being stung by them, she caused a large square hole to be made in the stools on which her bees stand, with a slider underneath, fitted to it. By this means she preserved another hive, which she had placed in the same garden on the same day, June 9th, 1761: and though it was a swarm put into a new straw hive, she observed moths in it by the end of July. She calls this hive N°. 1.

WHEN she secured this hive for the winter, she put it into a dry room: but the air there being too mild, the bees consumed almost their whole store. She drew the slider often; for the disaster which had happened to her other hive rendered her now more attentive; and she generally found a quantity of moths on it. The combs became mouldy, which she endeavoured to wipe off with soft brown

brown paper, and rubbed it off the sides of the hive with a napkin. So many bees died during the winter, that the hive became very weak in comparison to what it was in the autumn. About the middle of March, she placed it in a little garden surrounded with houses.

SHE placed near the former a swarm of June 1761, which had been kept in a hive of Mr. Paltau's construction^f, and had stood the preceding summer in the country, and the winter in a green-house in town, where the air was constantly kept temperate. Few of these bees died. She calls this hive No. 2.

THAT she might judge of the strength of these hives, she counted the bees which entered into each of them in a quarter of an hour; taking the same hour of a fine day. She repeated this during several weeks, and found that about six hundred and sixty entered in No. 2, and two hundred, or sometimes two hundred and twenty, in the same time, into No. 1.

IN May, the numbers of bees were so much increased, that it was no longer possible to count them. No. 1. was now as well stocked with bees as No. 2. She had been particularly careful of the former, and had fed them with honey in rainy weather. She had cleaned the

^f Described in a work intituled *Nouvelle Construction de Ruches*, printed at Metz in 1756. 8^{vo}. p. 316.

flider every morning, and often found on it even four moths at a time. She thinks that the bees can easily pull them out of their holes before their galleries have been strengthened with cross threads, and cemented with the crumbs of wax or their excrements. The bees do not always carry them out of the hive, but sometimes leave them on the stool, where the little maggots soon weave a case to conceal themselves in ; as she has known them do in a few hours. She found the greatest number of them at about four or five o'clock in the morning.

SHE resolved to place over N° 1. a glass hive, to give the bees an opportunity of working in it. With this view, she cut some rounds off the top of the straw hive, so as to make an opening of four inches, upon which she put a piece of board with a corresponding opening of four inches ; and on the 25th of March 1762 a glass hive was placed over it. She shut up the mouth of the straw hive, in order to oblige the bees to enter by an opening under the glass hive, which she covered, lest the cold might incommodate or even kill her bees, which were few in number. Though they increased so much by May as to be equal with N° 2, yet the bees never stopped in the glass hive. She judged from this, that they would rather descend, if she gave them a convenient habitation below. She therefore placed under the straw hive a box, which had an opening

opening in it of eight inches, for the bees to pass through. They soon extended their works downward, so that in a fortnight they almost filled the box with combs. On the 8th of July she took away the glass hive; and though it had hitherto served them only as a passage, they were much disconcerted when it was removed: for after she had filled up the opening in the top of the straw hive with flax and rue, the loaded bees continued for several days to fly round it, though the rue was disagreeable to them, before they would enter by the opening in the box, which was the only one they now had.

It is very remarkable, that the bees made no combs in the glass hive, though they were so fond of entering by it; and yet they descended into the box as soon as it was placed under them. We might have imagined it to be easiest for them to enter below, at the bottom of the box; but instead of so doing, they entered by the glass hive, passed through the straw hive full of combs, and carried their load down into the box. This gave her the first hint, that it was most adviseable to put the additional hive into which we would have the bees to work, under the full one, and she has since found it succeed accordingly.

On the 20th of July, she found that the bees of N° 1. had cast out so great a quantity of their young brood, that she gathered some handfuls.

handfuls of it about the hive. The bees continuing to do the same next day, she determined to take away the straw hive the day after. For this purpose, she chose eight o'clock in the morning, which she had observed to be the time when the greatest number of bees were gone into the fields. She began by loosening the straw hive from the board on which it rested, and to which the bees had fastened it with propolis. She then took the wadding out of the hole in the top of the straw hive; near to which some linen rags were kept smoking, and this smoke was blown into the hive by a pair of bellows. As soon as she judged that most of the bees had been forced down into the box, she caused a strong iron wire to be drawn through between the hive and the board it rested on, thereby to cut transversely all the combs which were extended from the hive into the box through the hole of communication. The hive was then taken up with all the combs but one, which separated from the middle of the hive. She carried this comb, with two fingers of each hand, to a table at some distance, on which the hive had been placed bottom up. The comb which she carried was almost covered with bees; and as it fell from the middle of the hive, where the queen generally resides, she searched for her, and found her on the first round of the hive, scarce able to crawl, being daubed with honey

honey which had flowed from the combs cut through. She washed her in a glass of water; but finding that this did not entirely carry off the honey which still adhered to her wings, she washed her a second time, and put her among several bees which had also been washed, but had recovered strength enough to assist their queen. They immediately set themselves to dry and assist her. She kept her thus for half an hour, in the presence of several curious persons, who had often sought in vain for her. As soon as she thought her able to make use of her legs and wings, she carried her to the stool on which the box remained, now to become the only habitation of the bees. Here she was again brushed and licked during an hour, by bees which were in great numbers on the fore part of the box, and at last she entered.

A FARMER with whom this lady kept some bees in the country had an old straw hive, which he intended to destroy in order to come at their honey and wax. She proposed to him to follow the same steps as she had taken with her's, which he agreed to, knowing that he could not lose any thing by it. Having been taught by experience, she advised him to put a box under the hive; rather than a hive over it. As she had observed that her own bees had so obstinately adhered to their former passage, she advised him to place the box at a small

small distance from the place where the hive had stood, that the whole might be the newer to them. They set to work heartily on the 3d of July; and by the 16th of August they had lain in so much provision, that she determined to take off the hive in the same manner as she had done her own. The honey did not run so much, because the weather was not so hot.

WHATEVER pains are taken to drive the bees out of the hive by means of smoke, many still remain in it. In order to preserve these bees, she found that the best way was to sweep them with the wing of a fowl into a tub of water, as fast as the combs were taken out. This practice was attended with several advantages. It prevented the people being stung, it cleared the bees of any honey that might have dropped on them, and it made many of their lice fall off them.

IN order to take them out of the water, she caused a thin linnen cloth to be spread over the mouth of an empty tub, in such manner that it hung every where over the brim, and was held there by one person, whilst another poured the water in which the bees were gradually through it. The bees remained on the cloth. It is essential that the quantity of water be large in proportion to the number of bees, and that they be quite senseless before they are taken out. If the first water tastes of honey, they should be bathed in a few

cond quantity. M.de Réaumurg lost many bees by not attending to this precaution ^h. When the bees have been sufficiently bathed, Madam Vicat spreads them on whited-brown paper, which, with the warm air, soon dries them.

IT was some time before this lady could find the queen of the farmer's hive. The country people who saw this operation, were struck with great compassion on seeing so many bees laid out, as it were, upon the table; for they thought them quite dead, and could not believe her when she assured them that they would all return to life. By the time she had found the queen, many of the bees had so far recovered, as to take care of her. Madam Vicat observed on her crocelet a louse, which she struck off with a pin. She saw a second on the hind part of her head; but it

^g Memoires pour servir à l'Histoire Naturelle des Insects, tom. v. p. 560.

^h As an instance how long some insects may retain life when immersed in a fluid, I have been assured by a very ingenious and accurate gentleman, that, being present at the opening of a bottle of Madeira wine which had been brought from Virginia to London, a fly was found in it. He immediately observed, that they had a fair opportunity of trying the truth of the common opinion, that a fly cannot be drowned; and desired the company to lay the fly in the sun, the day being very warm. The fly was accordingly laid on a China plate, and in less than hour it took wing. M. de Réaumur kept bees under water during nine hours, and all of them came to life. Tom. v. p. 540. They have remained twenty-four hours under an exhausted air-pump, and revived. Derham's Physico-Theology, book I. chap. i.

stuck

stuck so fast that she could not remove it; nor was she much solicitous about it, because the queen seemed to be in good plight. All the bees were placed on the stool before the box; and she was informed next day, that they had all soon returned to their companions. Having observed in the combs some cells which had young in them, she put an additional height under the box, in which she placed the combs with the young in them: and remarking on the 20th of August that there were several moths under the last addition, in which the combs with young were placed, she judged it not to be right to preserve such combs for the future. Experience has since confirmed her in this opinion.

IT is generally alleged, that the moths get so much the upper hand in the hives by the fourth year, that it is necessary to destroy the bees on the third year, in order to get the then remaining honey and wax; for that all would otherwise fall a prey to the moths. Madam Vicat has now shewn, that hives may be preserved from moths without condemning to the fire those precious labourers, the bees; a practice as barbarous as it is senseless; a practice which was strictly forbidden by a Grand Duke of Tuscany, under the penalty of severe punishment, as we are informed by M. de Réaumurⁱ. If care is not taken, even three years will be too long a time to al-

ⁱ Tom. v. p. 666.

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low; for the moths will frequently destroy a
hive the very first year.

THE lice which stick to bees are not generally thought to be prejudicial to them^k; and this may be true when there are but few of those vermin; but when every bee in a hive has two or perhaps three lice upon it, as is often the case, we may believe that the bees are greatly incommoded by them: indeed we may be assured of it, by their using every means in their power, though ineffectually, to get rid of them. M. de Réaumur declares^l, that he cannot think well of a hive in which the greatest number of bees have lice on them.

MADAM Vicat had a hive near a chair in her garden, in which she used to sit at work for hours. She one day saw many bees endeavouring to rid themselves of these troublesome enemies, and endeavoured, but to little purpose, to assist them, by killing the lice with her scissars. Recollecting that tobacco is a poison to many insects, she immediately strewed a little Morocco tobacco over some bees which had lice on them. The lice fell off instantly, as dead. In order to be assured that tobacco did not hurt the bees, she confined some which were lousy, under a glass placed on paper strewed with tobacco. After

^k Madam Vicat, in the Berne Memoirs above quoted, p. 135. ^l Tom. v. p. 711.

the bees had passed several times over the tobacco, the lice fell off them, dead. She left the bees in the glass three hours, and at the end of that time they appeared vigorous and well. She had bathed some bees in water, in order to rid them of the lice; but found that, though many of them fell off, they recovered themselves again as soon as the bees did. One of the lice jumped two inches high, to get at a bee which she held in her hand.

THE reverend Mr. Stephen White, Rector of Holton in Suffolk, informs us^m, that his fondness for these little animals soon put him upon endeavouring, if possible, to save them from *fire* and *brimstone*; that he thought he had reason to be content to share their labours for the present, and great reason to rejoice if he could at any time preserve their lives; to work for him another year; and that the main drift of his observations and experiments has therefore been, to discover an easy and cheap method, suited to the abilities of the common people, of taking away so much honey as can be spared, without destroying or starving the bees; and by the same means to encourage seasonable swarms.

IN his directions how to make the bee-boxes of his inventing, he tells usⁿ, speaking

^m Collateral Bee-boxes; or, An easy and advantageous Method of managing Bees, p. 7. of the introduction to the third edition. ⁿ Ibid. p. 1—6.

of the manner of constructing a single one, that it may be made of deal or any other well seasoned boards which are not apt to warp or split. The boards should be near an inch thick; the figure of the box square, and its height and breadth nine inches and five eighths, every way measuring within. With these dimensions it will contain near a peck and an half. The front part must have a door cut in the middle of the bottom edge, three inches wide, and near half an inch in height, which will give free liberty to the bees to pass through, yet not be large enough for their enemy the mouse to enter. In the back part you must cut a hole with a rabbit in it, in which you are to fix a pane of the clearest and best crown-glass, about five inches in length and three in breadth; and fasten it with putty: let the top of the glass be placed as high as the roof within-side, that you may see the upper part of the combs, where the bees with their riches are mostly placed. You will, by this means, be better able to judge of their state and strength, than if your glass was fixed in the middle. The glass must be covered with a thin piece of board, by way of shutter, which may be made to hang by a string, or turn upon a nail, or slide sideways between two mouldings. Such as are desirous of seeing more of the bees works, may make the glass as large as the box will admit, without weakening it too much; or they may

may add a pane of glass on the top, which must likewise be covered with a shutter, fastened down with pegs to prevent accidents.

THE side of the box which is to be joined to another box of the same form and dimensions, as it will not be exposed to the external air, may be made of a piece of slit deal not half an inch thick. This he calls the side of communication, because it is not to be wholly inclosed : a space is to be left at the bottom the whole breadth of the box, and a little more than an inch in height, and a hole or passage is to be made at top, three inches long, and more than half an inch wide. Through these the bees are to have a communication from one box to the other. The lower communication being on the floor, our labourers, with their burdens, may readily and easily ascend into either of the boxes. The upper communication is only intended as a passage between the boxes, resembling the little holes, or narrow passes, which may be observed in the combs formed by our sagacious architects, to save time and shorten the way when they have occasion to pass from one comb to another ; just as, in populous cities, there are narrow lanes and alleys, passing transversly from one large street to another.

IN the next place you are to provide a loose board, half an inch thick, and large enough to cover the side where you have made the communications. You are likewise to have

in readiness several little iron staples, an inch and half long, with the two points or ends bended down more than half an inch. The use of these will be seen presently.

You have now only to fix two sticks crossing the box from side to side, and crossing each other, to be a stay to the combs; one about three inches from the bottom, the other the same distance from the top; and when you have painted the whole, to make it more durable, your box is finished.

THE judicious bee-master will here observe, that the form of the box now described is as plain as is possible for it to be. It is little more than five square pieces of board nailed together; so that a poor cottager, who has but ingenuity enough to saw a board into the given dimensions, and to drive a nail, may make his own boxes well enough, without the help or expence of a carpenter.

No directions are necessary for making the other box, which must be of the same form and dimensions. The two boxes differ from each other only in this, that the side of communication of the one must be on your right-hand; of the other, on your left. *Fig. 6, (Pl. I.)* represents two of these boxes, with their openings of communication, ready to join to each other.

MR. White's manner of hiving a swarm into one or both of these boxes, is thus^o.

^o *Ibid.* p. 6—8.

You are to take the loose board, and fasten it to one of the boxes, so as to stop the communications. This may be done by three of the staples before mentioned ; one on the top of the box near the front, the two others on the back, near the top and near the bottom. Let one end of the staple be thrust into a gimlet hole made in the box, so that the other end may go as tight as can be over the loose board, to keep it from slipping when it is handled. The next morning, after the bees have been hived in this box, the other box should be added, and the loose board should be taken away. This will prevent a great deal of labour to the bees, and some to the proprietor.

BE careful to fasten the shutter so close to the glass, that no light may enter through it ; for the bees seem to look upon such light, as a hole or breach in their house, and on that account may not so well like their new habitation. But the principal thing to be observed at this time, is to cover the box, as soon as the bees are hived, with a linnen cloth thrown loosely over it, or with green boughs, to protect it from the piercing heat of the sun. Boxes will admit the heat much sooner than straw hives ; and if the bees find their house too hot for them, they will be wise enough to leave it. If the swarm be larger than usual, instead of fastening the loose board to one box, you may join two boxes together with

with three staples, leaving the communication open from one to the other, and then hive your bees into both. In all other respects, they are to be hived in boxes after the same manner as in common hives; which being well known, it were needless here to give particular directions concerning it.

THE door of the second box should be carefully stopped up, and be kept constantly closed, in order that the bees may not have any entrance but through the first box.

WHEN the boxes are set in the places where they are to remain, they must be screened from the summer's sun, because the wood will otherwise be heated to a greater degree than either the bees or their works can bear; and they should likewise be screened from the winter's sun, because the warmth of this will draw the bees from that lethargic state which is natural to them, as well as to many other insects, in the winter season. For this purpose, and also to shelter the boxes from rain, our ingenious clergyman has contrived the following frame.

Fig. 7 (Pl. I.) represents the front of a frame for twelve^P colonies. *a, a,* are two cells of oak, lying flat on the ground, more than four feet long. In these cells you are to fix four oaken posts, about the thickness of such as are used for drying linnen.

^P *Ibid.* p. 13.

THE two posts *b, b*, in the front, are about six feet two inches above the cells: the other two, standing backward, five feet eight inches.

You are next to nail some boards of slit deal horizontally from one of the fore-posts to the other, to screen the bees from the sun. Let these boards be seven feet seven inches in length, and nailed to the inside of the posts, and be well seasoned, that they may not shrink or gape in the joints.

c, c, are two splines of deal, to keep the boards even, and strengthen them.

Fig. 8 (Pl. 1.) represents the back of the frame. *d, d, d, d*, are four strong boards of the same length with the frame, on which you are to place the boxes. Let the upper side of them be very smooth and even, that the boxes may stand true upon them: or it may be still more adviseable, to place under every pair of boxes a smooth thin board, as long as the boxes, and about a quarter of an inch wider. The bees will soon fasten the boxes to this board, in such manner, that you may move or weigh the boxes and board together, without breaking the wax or resin, which for many reasons ought to be avoided. These floors must be supported by pieces of wood, or bearers *e, e, &c.*, which are nailed from post to post at each end. They are likewise to be well nailed to the frame, to keep them from sinking with the weight of the boxes.

f repre-

f represents the roof, which projects backward about seven or eight inches beyond the boxes, to shelter them from rain.

You have now only to cut niches or holes in the frame, over against each mouth or entrance into the boxes, at *b*, *b*, *b*, in *Fig. 7.* Let these niches be near four inches long; and under each you must nail a small piece of wood for the bees to alight upon.

THE morning or evening sun will shine upon one or both ends of the frame, let its aspect be what it will: but you may prevent its over-heating the boxes, by a loose board set up between the posts, and kept in by two or three pegs.

THE same gentleman, with great humanity, observes^q, that no true lover of bees ever lighted the fatal match without much concern; and that it is evidently more to our advantage, to spare the lives of our bees, and be content with part of their stores, than to kill and take possession of the whole.

ABOUT the latter end of August, says he, by a little inspection through your glasses, you may easily discover which of your colonies you may lay under contribution. Such as have filled a box and an half with their works, will pretty readily yield you the half box. But you are not to depend upon the quantity of combs, without examining how they are stored

with honey. The bees should, according to him, have eight or nine pounds^r left them, by way of wages for their summer's work.

THE most proper time for this business is the middle of the day^s: and as you stand behind the frame, you will need no armour, except a pair of gloves. The operation itself is very simple, and easily performed, thus: open the mouth of the box you intend to take; then, with a thin knife, cut through the resin with which the bees have joined the boxes to each other, till you find that you have separated them; and after this thrust a sheet of tin gently in between the boxes. The communication being hereby stopped, the bees in the fullest box, where it most likely the queen is, will be a little disturbed at the operation; but those in the other box, where we suppose the queen is not, will run too and fro in the utmost hurry and confusion, and send forth a mournful cry, easily distinguished from their other notes. They will issue out at the newly opened door; not in a body, as when they swarm, nor with such calm and cheerful activity as when they go forth to their labours; but by one or two at a time, with a wild flutter, and visible rage and disorder. This, however, is soon over; for as soon as they get abroad, and spy their fellows,

^r This is less by one half than other writers allow.

• P. 22.

they

they fly to them instantly, and join them at the mouth of the other box. By this means, in an hour or two, for they go out slowly, you will have a box of pure honey, without a living bee in it to molest you ; and likewise without dead bees, which, when you burn them, are often mixed with your honey, and both waste and damage it.

MR. White acknowledgest, that he has sometimes found this method fail, when the mouth of the box to be taken away has not been constantly and carefully closed : the bees will, in this case, get acquainted with it as an entrance, and when you open the mouth in order to their leaving this box, many of them will be apt to return, and, the communication being stopped, will, in a short time, carry away all the honey from this to the other box ; so much do they abhor a separation. When this happens, he has recourse to the following expedient, which he thinks infallible. He takes a piece of deal, a little larger than will cover the mouth of the box, and cuts in it a square nich somewhat more than half an inch wide. In this nich he hangs a little trap door, made of a thin piece of tin, turning upon a pin, with another pin crossing the nich a little lower, so as to prevent the hanging door from opening both ways. This being placed close to the mouth, the bees

which want to get out will easily thrust open the door outwards, but cannot open it the other way, to get in again; so must, and will readily, make to the other box, leaving this in about the space of two hours, with all its store, justly due to the tender-hearted bee-master, as a ransom for their lives.

WHAT led Mr. White to prefer collateral boxes to those before in use, was^u, to use his own words, his "compassion for "the poor bees, who, after traversing the "fields, return home weary and heavy "laden, and must perhaps deposit their bur- "den up two pair of stairs, or in the gar- "ret. The lower room, it is likely, is not "yet furnished with stairs: for, as is well "known, our little architects lay the foun- "dation of their structures at the top, and "build downward. In this case, the weary "little labourer is to drag her load up the "sides of the walls; and when she has done "this, she will travel, many times, back- "ward and forward, as I have frequently "seen, along the roof, before she finds the "door, or passage into the second story; and "here again she is perplexed with a like puz- "zling labyrinth, before she gets into the "third. What a waste is here, of that pre- "cious time which our bees value so much, "and which they employ so well? and what

^u P. 35.

" an

" an expence of strength and spirits, on which
" their support and sustenance depends? In
" the collateral boxes, the rooms are all on
" the ground floor: and because I know my
" bees are wise enough to value convenience
" more than state, I have made them of such
" a moderate, though decent, height, that
" the bees have much less way to climb to
" the top of them, than they have to the
" crown of a common hive."

MR. White^w is confident that the expence of his boxes, and of the frame above described, will not, if a reasonable allowance be made for their duration, prove greater, in the end, than the charge of straw hives, and of the frames that are made, in most places, for their reception: to which he adds, that a great part of this expence may be saved, if the bee-master can spare a place within any of his buildings, especially if they be boarded, where he may fix his stools for the boxes to stand on, making holes at proper distances for the bees to work out at: nor need he be very solicitous concerning the aspect or height of his buildings; for bees have been known to thrive well, and get a large quantity of honey, though placed almost at the top of a high turret in Trinity College, and on the north side of it.

^w P. 37.

MADAM Vicat, already mentioned with well deserved commendation, having observed many inconveniences attending the use of boxes or hives which stand on one another^x, likewise contrived what I may call collateral boxes, of a very simple and seemingly convenient structure.

SHE tells us, that she has always been of opinion^y, that the cells intended for breeding the young are placed in the centre of the hive. The hive is both drier and warmer there than in any other part. The moisture which flies upwards might be prejudicial to the young. The method which the bees observe in laying up their honey confirms this opinion. The centre is the last part filled, after the young broods are all become bees; and this honey is the first consumed, probably to make room for the queen's laying her eggs in those cells in the spring. This is much more likely, than that the bees should eat that part first, because it would putrefy if kept. The queen begins early in the spring to lay her eggs, and she lays great numbers of them. M. de Réaumur says, that she lays two hundred eggs in twenty-four hours, and that six thousand bees are sometimes brought to perfection in the space of three weeks. On this principle Madam Vicat has contrived

^x Mémoirs, &c. de la Société de Berne: Année 1764,
Part I. p. 119. ^y Ibid. p. 123.

her boxes, so that these cells, so much wanted in the spring, shall not be taken away.

SHE places her boxes on a stool, or rather table, of fir; for oak, being a more solid wood, is colder, and thereby the bees, which either fall or rest upon it in the winter, may be so chilled as not to be able to rise again. This table is three feet long, fifteen inches in breadth, and three inches thick. It slopes on the sides, which gives the middle an elevation that keeps it dry in rainy weather. There run along each side two grooves, the innermost to receive the boxes, and the other, which is deeper, to receive the cover. In the middle of the table is a hole eight inches square, which is closed with a slider supported underneath by grooves cut in the solid wood. There is in the slider a hole four inches square; and this hole is covered with a plate of tin pierced with little holes, like the nozzle of a watering-pot, in order to admit air in hot weather. For the winter, and for the cold nights in spring and autumn, there is a slider of solid fir, which keeps out the air. The table is rested upon four strong feet, high enough to admit of examining the state of the bees from below. That the bees may have a convenient landing place before the hive, the table is extended some inches forward beyond the cover, and terminates there in a semi-circle.

THE

THE hive or colony is composed of four boxes, if I may be allowed this expression, where there are only three sides. It may consist of three or of two boxes, as may be most agreeable to the owner. Each of the boxes is made of three pieces of deal, a full half inch thick. The two standing pieces are each eleven inches in height, and five and a half in breadth, and are dove-tailed into the piece at top, which sets the two standards at the distance of seven inches from each other above, whilst they are ten inches asunder at the bottom. They are kept thus distant by a rod, or thin piece of wood, which at the same time renders the box the stronger. This rod is placed within two inches of the bottom; and another is made to cross about an inch from the top, in order to afford a prop or stay to the combs. These boxes are not jointed or set into each other. They are only set quite close together; so that any one of them may be easily separated from the rest of the colony. They are connected by rods of wood which run along the whole colony, and pass through wooden rings fixed to each side of each box. Each of these wooden rods has a hole in the end next the back of the colony, fit to receive a large iron wire, which after being passed through the holes, is drawn tight, to secure the piece of deal which forms the back of the colony. The piece which forms the fore-part of the colony is secured by two

nuts screwed on to the ends of the wooden rods which come to the fore part of the colony. By these means the boxes are kept very close together. The pieces of deal at each extremity of the colony or hive are exactly fitted to the boxes, so as not to exceed them in any part. These pieces being placed only at the extremities of the hives, when any part is taken away, what remains may be slipt or pushed forward or backward in the grooves, and the extremities be immediately fitted thereto. There is in the middle of the end-pieces an opening, that in the front to give an outlet to the bees, that in the rear to be usually shut up. Three of these boxes hold as much as an ordinary straw hive: but the addition is not too much for a strong stock of bees.

THERE is on the table, as already mentioned, an outer groove to receive the cover of the boxes, which is made of fir, above half an inch thick. On one side it is thirteen inches high, and on the other seventeen; so that there may be a declivity sufficient to carry off the rain water. There is in the fore part of it an opening, answering to the opening in the hive, to admit the bees. To this opening in the cover a frame is fixed, either on a pivot, or in a groove, and there are in it four partitions, to be either turned on the pivot, or moved in the groove, as occasion requires. The first partition gives a free passage to the bees

bees, and is applied to the mouth of the cover in the working or swarming season: the next narrows the passage so that but few bees can get out or in at a time, and is used when there is danger of robbers; the third is pierced full of holes to let in air, whilst it confines the bees, and is used chiefly in the beginning and end of winter: the fourth is entirely shut, and is applied when the weather is extremely cold.

IT will be convenient to have panes of glass in the sides of the boxes; and a hole to be opened occasionally at top, through which a thermometer may be introduced whenever it is thought proper.

WHEN one of these hives or colonies is first peopled, the upper piece or top of one of the boxes is taken off, and the straw hive is placed upon the opening, putting a grate of wire in the hole, to prevent an union of the combs in the box with those in the hive, which would render the separation more difficult.

IN the month of October, the first and fourth boxes, counting from the entrance, may be taken away; and this at a time when we are sure of not taking away any of the young brood; nor, as we have just observed, any of the cells appropriated for them, these being in the middle of the hive. When a box is to be taken away, the rod which holds the boxes firmly connected is unscrewed. The boxes which are to remain untouched may be secured

by staples. The opening in the bottom of the piece of deal which forms the back part of the hive is then to be opened, and the smoke of linnen rags is blown into the box. As soon as we can judge that the bees are by this means driven out of the farther box, the end is loosened and taken away; then the box itself is loosened from the next, and the combs, if they run in a longitudinal direction, must be cut through with a wire, or a sharp thin knife. If the combs run cross-wise, they may be taken out singly, before the box is taken away. The box being then removed, the piece of deal forming the back of the hive is immediately joined to the remaining box, and secured as it was before. The smoke should be kept up all the time, to prevent interruption from the bees. If the first box is to be taken away, exactly the same steps are pursued; and if it be done when most of the bees are abroad, scarce a bee will be lost.

As soon as both boxes are taken away, the remaining boxes should be slipped forward, so as to make the front stand where it did before; and when the additional boxes are added in the spring, the two remaining boxes are pushed back to the farther end. If the season is favourable, both the old boxes may be taken away in the summer.

In this method, no void space is left in the hives, and consequently the bees are not thereby exposed to so great a degree of cold as might endanger

endanger great numbers of their lives. We should, on this account, avoid adding an empty box whilst the nights continue cold in the spring. With proper care, the bees increase as fast in these colonies, as in any hives; and if swarms are wanted, it is but delaying the addition of empty boxes in the spring.

*EXPLANATION OF THE FIGURES
REPRESENTING MADAM VICAT'S
BOXES.*

PLATE II. *Fig. 1.* A B C D represents the inside of the hive composed of its four boxes put together, laid on their sides *a a*. E E are rods with screws, which serve to connect the boxes of the hive. F F mark the front and the back of the hive. G the mouth of the fore part of the hive. *bb* are the bottoms of the boxes seen in their insides; but properly the tops as they stand in the hive. *cc* are notches which serve to fasten the hive to the ledge of the table, *Fig. 3.* *dd* are the rods destined to support the combs: these rods are eight in number, two to each box, which they traverse breadth-wise. *ee* are two screw-nuts moveable along the rods E E, and which serve to fasten the boxes more or less closely to each other. *ff* are the wooden rings through which the screw-rods pass.

Fig. 2. represents one of the boxes separated from the hive. It shews the same parts,

marked with the same letters, as in *Fig. 1*; namely, *aa* the sides, *b* the bottom, *dd* the rods, and *f* the ring of this box.

Fig. 3. shews the table of the hive seen from above A B C D. E is the back part of this table. F F are hollows made in the under side of the table, to receive the legs which are nailed to it. G a groove to receive the slider of the table represented in *Fig. 5.* b b ledges which enter into the notches c c of *Fig. 1.* aa ledges which fix the cover represented in *Fig. 7.* cc is the opening made in the table of the hive, in order to its being visited and cleaned by means of the drawer *Fig. 5.*

Fig. 4. represents the under surface of the table A B C D. E is the fore part of it; F F are the hollows of the preceding figure. G is likewise the same groove as that of *Fig. 3.* and c c the same opening as the preceding figure represents.

A, *Fig. 5.* represents the drawer of the table. B B is a linnen slider intended to let air in at the bottom of the hive. a is the handle of this drawer. b b are the ledges which serve to secure it in the groove C of *Fig. 3* and 4.

Fig. 6. A B is the entire hive composed of its four boxes *aa bb*; of its screw-rods E E; of its table a b c d, the fore part of which is marked E. The fore part of the hive is marked F, and its mouth is marked

G.

G. The ledges of the table are marked with the same letters *aa bb* as in the foregoing figures; and the feet *ff* are nailed in the notches on each side of the groove *g* made to receive the drawer represented by *Fig. 5.*

A B, *Fig. 7.* is the cover with its moveable circle, in which last the part *e* is pierced with holes, *f* is quite open, *ggggg* are five little arched openings for the passage of the bees, and the use of the close part *d* is to shut intirely the opening *G* of the foregoing figure, when the weather is too cold for the bees.

N. B. THE screw-rods should not be made to project on each side of the hive so much as they do in *Fig. 1*; but they should be as represented in *Fig. 6.* where they are fastened behind by means of an iron rod.

HAVING thus given an account of every method that has been or now is practised for obtaining the honey and wax, I shall proceed to consider what farther is wanted in order to secure the future welfare of the bees.

OF THE DISEASES OF BEES.

IT has been already mentioned, that before the honey is taken all the hives should be examined, to know what state they are in. Every hive should have at least fifteen, but rather twenty, pounds of honey in it, for the winter provision of the bees. If they have not that quantity, the deficiency should be

made up to them. The best way of doing this is not yet sufficiently ascertained, as will soon appear more fully when we shall have considered the effects of cold on the bees, and especially on the honey.

PROVIDENCE has ordained that insects which feed on leaves, flowers, and green succulent plants, are in an insensible or torpid state from the time that the winter's cold has deprived them of the means of subsistence. Thus the bees, during the winter, are in so lethargic a state, that little food supports them : but as the weather is very changeable, and every warm or sunny day revives them, and prompts them to return to exercise ; food becomes necessary on these occasions. Mr. White very judiciously observes ^a, that a greater degree of cold than is commonly imagined to be proper for bees, is favourable to them in winter. If a sharp ^b frost continues for two or three months, without intermission, you may observe, through your glass, that the bees are all this time closely linked together in clusters between the combs. If they are not altogether without motion, yet it is certain they stir not from their places, while the cold continues, and therefore eat not at all.—This gives us a plain reason why more bees are observed to die in open and warm, than in cold and severe winters.

^a P. 9.

^b P. 10.

WE are indebted to Madam Vicat for an observation which plainly shews, that the winter brings destruction on whole hives, from a cause not thought of before. I shall give nearly her own account of it, as delivered in the above mentioned memoirs of the Berne Society^s. The farmer to whom she intrusts the care of her bees in the country lost a hive in the winter of 1763, in a manner that had never happened before. There was plenty of provision in the hive, and it was as well stocked with bees as any other. They did not die of cold, for the weather was warm, and they went abroad the day before their almost sudden destruction. Of eight hives which he had in another apiary, six perished in the same manner.

SHE had a glass hive, in which the number of bees was reduced in the spring to about four hundred. In order to strengthen it, she resolved to take about a thousand bees from one of her strongest hives, and to add them to this. She knew that bees, by being bathed together, are reconciled to one another as soon as they return to life; and therefore took the following method. She held the mouth of a wide-mouth'd bottle to the opening of the strong hive, whilst, with the other hand, she gently struck the hive. Upon this, the bees

issued into the bottle held close to the mouth of the hive; and as soon as she judged that a sufficient number of them had entered the bottle, she clapped a paper over the mouth, and held the bees prisoners. The bees in the glass hive were so much chilled by the cold of the night, that they easily fell down when this hive was struck, and were taken. After the bees had been a few minutes in the water, she spread them out on a brown paper to dry, and afterwards put them into a bag of clear sieve-cloth. It was not necessary to bathe the queen. She therefore secured her under a glass, with about a dozen of bees to keep her warm. The bees being all returned to life, she put the queen into the hive, and applying the mouth of the bag to the mouth of the hive, all the bees entered, and ranged themselves on the combs.

AT night she drew out the slider in order to wipe the bottom of the hive. There she found a great deal of candied honey, and several bees which seemed to be expiring. In the morning, she found many more in the same situation, and knew not what to impute it to. This was on the 24th of March; and the weather was so cold, that the bees of her other hives did not go abroad. At eleven in the morning, she saw the queen in the midst of a group of bees on a comb. She could not conceive the meaning of a noise that was frequently made in the hive. As often as she heard

heard this noise she approached, and was grieved to see numbers of bees fall to the bottom. They struggled as much as possible to get upon the combs, but could not.

SHE had never heard that candied honey is prejudicial to bees; yet could not account for this havock from any other cause: for the bees, not being able to swallow the candied honey, emptied it out of the combs, in order to come at such as they could swallow. The candied honey falling on the bottom of the hive, the bees could not stir without daubing themselves in it. Their legs were clogged with it, and by their endeavours to rid one another of it, they daubed each other more and more. Their bodies were smeared with it, and their wings so loaded that they could not fly.

ON the morning of the 25th; she searched in vain for the queen on the combs, where only a few bees now remained free from this misfortune. In general, the queen is the last that suffers any injury; by reason of the great care which the other bees take of her. Here, that very care became her destruction; for, all of them being more or less clogged with candied honey, their endeavours to help her served only to increase her already too great load. All attempts to relieve them were fruitless.

THE honey does not candy every year; and even in the coldest weather this accident is not universal.

universal. Madam Vicat had an instance of it; for, in an apiary where there were a dozen hives, only one perished; and in another where six perished, two remained safe. It seems probable, that the honey candies when the weather changes suddenly from warm to cold. Whilst the weather continues cold, the bees remain in a lethargic state, eat none of it, and therefore do not then open any of the cells: but if there be returns of warm weather, they want food in this weather, and in this case they do open their cells. A sudden return of cold congeals or candies the honey in these open cells. On the return of warm weather, the bees return to the cells they had opened, and finding there a substance which is too solid to pass into their stomachs, or which they cannot swallow, they throw it out of the cells, in search of good honey: the candied honey falls upon the stool, or bottom of the hive, and by this means they make their own graves. The antients seem to have known that candied honey is prejudicial to bees. Virgil cautions particularly against leaving an opening so large as to admit a degree of cold capable of congealing the honey.

MANY hives of bees which are thought to die of cold in the winter, in truth die of famine; as was the case in the winter of 1759: for the constant rains of the preceding summer hindered the bees from laying in a sufficient store of provisions. The hives should be carefully

fully examined in the autumn, and should then weigh at least eighteen pounds.

THESE observations of Madam Vicat's seem to account more rationally than any other reasons I have yet seen assigned, for a purging which writers speak of as incident to bees in the spring. Columella describes it ^d as an annual distemper which seizes them in the spring, when the spurge blossoms, and the elm discloses its seeds; for that the bees, being allured by the first flowers, feed so greedily upon them, that they surfeit themselves therewith, and die of a looseness if they are not speedily relieved. He relates Hyginus's advising, in this case, to cover the bees with ashes of the fig tree; and affirms, that, being enlivened by the warmth of these ashes, the bees will revive in two hours, and go into a hive brought to them. Columella advises giving them rosemary and honey diluted with water. Aristomachus seems to have prescribed the most effectual cure, namely, to take away all the vitiated combs, that is, all the combs in which there are open cells appearing to contain candied honey.

THE authors of the *Maison rustique* ^e impute this purging to the bees feeding on pure honey, which does not form a food sufficiently substantial for them, unless they have bee-bread to eat at the same time; and advise giving them a honey-comb taken from another hive,

^d Lib. ix. c. 13. ^e Tom. i. part i. liv. v. c. 1. p. 454. 7th Edit. 4to.

the cells of which are filled with crude wax or bee-bread.

UPON the whole, there is an undoubted want of experiments to ascertain both the time and the manner in which bees should be fed. It is certain, that honey is more apt to candy when mixed with a small proportion of water, than it is in its natural state. For this reason, I should defer till spring the feeding of the bees, and then feed them sparingly, as occasions may require. The common practice is to feed them in the autumn, giving them as much honey as will bring the whole weight of the hive to near twenty pounds. To this end, the honey is diluted with water, and then put into an empty comb, split reeds, or, as Columella directs^f, upon clean wool, which the bees will suck perfectly dry.

THE following directions given for this purpose in the *Maison rustique*^g seem to be very judicious. Replenish the weak hives in September, with such a portion of combs full of honey, taken from other hives, as shall be judged to be a sufficient supply for them. In order to do this, turn up the weak hive, after taking the precaution of defending yourself with the smoke of rags, cut out the empty combs, and put the full ones in their place, where secure them with pieces of wood run a-cross, in such manner that they may not fall

^f Lib. ix. c. 14. ^g Tom. i. part i. liv. v. c. 1. p. 435.

down

down when the hive is returned to its place. The bees will soon fix them more effectually. If this method be thought too troublesome, set under the hive a plate of liquid honey, unmixed with water, with straws laid a-cross it, and over these a paper pierced full of holes, through which the bees will suck the honey without daubing themselves. This should be done in cloudy or rainy weather, when the bees stir least abroad; and the hive should be covered, to protect the bees from robbers, who might be allured to it by the smell of the honey.

ANOTHER circumstance which may render it very necessary to feed the bees, is, when several days of bad weather ensue immediately after they have swarmed; for then, being destitute of every supply beyond what they carried with them, they may be in great danger of being starved. In this case honey should be given them, in proportion to the duration of the bad weather.

THE degree of cold which bees can endure has not been ascertained. We find that they live the cold parts of Russia, and often in hollow trees, without any care being taken of them. Their hives are frequently made of the bark of trees, which does not afford them much protection from cold. Mr. White^h therefore judiciously confirms Mr. Gedde's observation, that bees which stand on the north side of a building whose height intercepts the

sun's beams all the winter, will waste less of their provisions (almost by half) than others which stand in the sun: for coming seldom forth, they eat little, and yet, in the spring, are as forward to work and swarm, as those which had twice as much honey in the autumn before. The owner should, however, examine their state in the winter, and if he finds that, instead of being clustered between the combs, they fall down in numbers on the stool or bottom of the hive, the hive should be carried to a warmer place, where they will soon recover. He must be cautious in returning them again to the cold, lest the honey be candied, as before observed.

WHERE the winters are extremely severe, the authors of the *Maison rustique* advise ⁱ, to lay on the bottom of an old cask the depth of half a foot of very dry earth, powdered, and pressed down hard, and to set on this the stool with the hive; then, to preserve a communication with the air, which is absolutely necessary, to cut a hole in the cask, opposite to the mouth of the hive, and place a piece of reed, or of elder made hollow, from the mouth of the hive to the hole in the cask; and after this to cover the hive with more of the same dry earth. If there be any room to fear that the bees will not have a sufficiency of food, a plate with honey, covered as before directed, may be put

ⁱ Tom. i. part i. liv. v. c. 1. p. 441.

under the hive. If the number of hives be great, boxes may be made of deals nailed together, deep enough to contain the hives when covered with dry earth. The bees will thus remain all the winter free from any danger from cold, hunger, or enemies.

OF SEPARATING THE HONEY FROM THE WAX.

IN order to separate the honey from the wax, the combs should be laid in a place perfectly secure from the access of bees; for otherwise the bees would not only carry off much honey, but also be extremely troublesome, by stinging the people at work. It is proper to burn cow-dung or rotten hay at the doors and windows of this place; because the smell of the smoke arising from thence is so disagreeable to the bees, that it will drive them away. If any bees remain in the combs, they should be brushed off with the wing of a fowl into a tub of water, and being afterwards dried in another place, they will fly back to their hive. If the combs are taken out of the hive before the end of autumn, there are generally young bees in them. The parts of the combs in which these are should be laid aside, for they would give a bad taste to the honey. The bee-bread must also be separated, and both should be melted with the wax.

BEFORE the combs are laid to drain out their honey, they should be carefully cleaned of every sort of filth, or insects. The crust with which the bees cover the honey in them should then be pared off with a sharp thin broad knife, and the combs themselves should be divided through the middle, in such manner as to render the cells open at both ends, that the honey may flow the more freely out of them. The combs should be laid in this state on sieves, or some other contrivance which will afford the honey a free passage. It will run quite clear; and the honey thus obtained should be kept by itself, as being the purest and best.

THE combs which are but partly filled, and also those that were full and have done running, are broken by hand, and the honey in them is squeezed out. Some put the broken combs into a strong bag, and then use a press to squeeze the honey out of them; and even warm the broken combs with the help of fire: but neither of these last consider that, in both these ways, much of the wax passes through the bag with the honey, and that the wax being of greater value than the honey, the owner sustains a loss in that respect, besides that his honey becomes the less valuable, in proportion to its being less pure. It is true, that great part of the wax thus mixed with the honey soon rises to the surface, and may be taken off, especially after the honey is grown hard.

THE makers of mead need not be extremely solicitous about separating the honey so very perfectly from the wax, because, by washing the wax in cold water, the honey will dissolve in the water, and the wax being strained from it by running the water through a coarse cloth, neither bad taste nor impurity will be communicated by it to the water, which may afterwards be used for making mead. The wax that has been skimmed off the honey separated by pressure, should be washed in the same manner; because, by this means, no part of the wax will be lost.

THE goodness and flavour of honey depend on the fragrance of the plants from which the bees collect it: and hence it is that the honey of different places is held in different degrees of estimation. That which is made early in the year is also preferred to what is collected in the latter end of the season.

IN order to obtain the wax in a pure state, what remains of the combs after separating the honey, together with the combs which contain bee-bread and young bees or maggots, is put into a copper with a sufficient quantity of clean water, which is made to boil over a slow fire, and stirred frequently with a stick. When the wax is melted, it is run through bags, which are put into a press, to separate the wax perfectly. The wax runs from the press into a vessel placed underneath, with some water in it, to prevent the wax from sticking to it. What

mains after the pressure may be again boiled in water, in order to obtain more wax from it: and this should be repeated by slow boilings, rather than by boiling it strongly at once.

WHEN all the wax is thus separated from the dregs, it is again melted in water, over a very gentle fire, and skimmed clean whilst any scum arises. It is then poured into vessels suited to give it the desired form, after previously putting into them a little water, to keep the wax from sticking to them. These vessels are then carried into a place where the wax may cool gradually. It is found that, the larger the cakes of wax are, the better the wax keeps, and the higher price it brings; also, that the more gently it has been boiled, the better it likewise is: for too hasty boiling renders it hard, and this increases the difficulty of bleaching it. Whatever filth sticks to the bottom of the cake is scraped off with a knife.

I HAVE hitherto supposed the husbandman to be possessed of bees; but as this cannot always be the case, I shall here subjoin some directions to guide him in choosing them.

DIRECTIONS FOR PURCHASING OF BEES.

THE spring is the most proper season for purchasing of bees, because they have then passed the dangers of the winter. The sum

summer is an improper time for buying them, because the heat of the weather then softens the wax, and thereby renders the combs liable to break, if they are not very well secured. The honey too, being then thinner than at other times, is more apt to run out of the cells, which is attended with a double disadvantage,¹ namely, the loss of the honey, and the daubing of the bees, whereby many of them may be destroyed. A first and strong swarm may indeed be purchased, and be carried away in the night after it has been hived.

THE hive should be full of combs, and well stored with bees. The purchaser should examine the wax^k, in order to know the age of the hive. The combs of a year old are white; those of two years are dark coloured, or yellow; and where the combs are black, the hive should be rejected; because old hives are most apt to be infected with the moth, and most liable to other accidents. For this reason, the state of the combs should be examined as high up as possible; because the lower parts of the combs may have been cut off, and renewed in the preceding summer. It sometimes, though rarely, happens, that two queens continue to govern separately in the same hive^l; and in this case a large comb forms the barrier. Such hives should be rejected, because there is

* *Maison Rustique*, tom. i. p. 415. 7th Edit.

¹ *Ibid.*

not in them that harmony which is necessary for the success of the bees.

IN order to judge of the state of the hive it may be raised a little in the evening, so as to admit a more than usual degree of cold ; for this will drive the bees to the top of the hive, and so benumb them, that the next morning there will be no danger of their stinging. If any such danger does appear, a pot of lighted charcoal, with some linen rags upon it, may be got ready, and held under the hive whilst it is pulled back in order to be examined.

WE may also judge of the thriving state of the hive by the following appearances. Bees which are in good condition will get into the fields early in the morning, return loaded, enter boldly, and not come out of the hive in bad weather ; for when they do, this indicates that they are in great want of provisions. They are alert on the least disturbance ; they preserve their hive free from all filth, or dead nymphs or bees ; they are ready to assist the bees which return loaded from the fields, and to defend the hive against every enemy that dares to approach : they make a continual humming noise, which increases on the least touch. Indeed, by the loudness of the humming we may judge of the strength and progress of the hive, and therefore this should be frequently noticed, to enable us to form the better judgment of the state the bees are in.

THE authors of the *Maison rustique* observe^m, that a particular species of wood-bees, larger than the domestic bees, and of a dark brown colour, sometimes mix with these last, and, in this case, often carry them off, being of a restless disposition. They advise killing all such, whenever they are observed. However this may be, the species of domestic bees is frequently found in woods and forests. Columella thought it of such importance to be able to discover them there, that he gives the following directions for that purposeⁿ.

DIRECTIONS FOR DISCOVERING BEEs IN WOODS OR FORESTS.

APRIL, when the willow is in bloom, or May, when the white thorn blossoms, is a proper season for discovering the abode of bees in woods, or near any place where there is plenty of flowers. They are also found to resort to neighbouring springs. It is proper to observe early in the morning, whether many or few frequent these places: if but few, their abode is distant, or their whole stock is not numerous: but if they appear in numbers, there is the greater room for hope to find their habitation.

THEIR return to springs being frequent, you may use the following method to discover the

^m Ubi supra, p. 416.

ⁿ Lib. ix. c. 8.

distance

distance at which they live from the spring. Have by you some oker dissolved in water, and wet in this some stalks of grass, with which touch the bees on the back when they come. By their being thus marked, you will be able to judge whether they return soon; if they do, it is a sign that their home is not far off; and by the time they take to appear again, you will be able to judge at what distance it is. If they return soon, you may perhaps follow them to their place of resort.

IF the bees come from a-far off, more skill is requisite to discover their dwelling; and in this case, the following method may be used. Cut an intire joint off a large reed, with the knot at one end; bore a hole in the side of it, and through this drop some honey into its inside; then lay it near the spring or other resort of the bees. When the smell of the honey has inticed some of them into it, take it up, clapping your thumb on the orifice, and let go one of the bees, which pursue as long as you can keep sight of it. When you have lost sight of it, let another fly; and if it follows the same course, continue the pursuit. By this means you will be led to their abode. If any of the bees take a different course, let another fly, and so on, till you find one take the same course as the first: or if you find two or more fly the same way, though different from that of the first, pursue them.

IF the bees are lodged in a cave, they must be expelled by smoke ; and when they are settled on a tree or shrub, put them into a proper hive, in the usual way, and carry them home in the night. You may then safely get at their honey. If they have taken up their station in a hollow tree, the upper part of the tree should be sawed off, as near to them as may be without touching them, and then a farther part of it should be sawed off just below them, with the same precaution as before. The hollow part of the tree, thus cut at both ends, should be covered with a clean cloth, a circumstance of great importance ; and if there be any chinks in it, these must be filled up with proper plaster, so as to leave only one opening for the common passage of the bees. In this state, it is placed in the apiary. This work must be done in the morning, that you may have the remainder of the day before you.

SOME rub hives with aromatic plants agreeable to bees, and then with honey ; after which they place them near to springs or other places that bees resort to, especially about their time of swarming. The bees, thus allured, settle sometimes in these hives, which are afterwards carried home.

THE reader of this essay may not be displeased at my closing it with the following

DIRECTIONS FOR MAKING MEAD.

ALL the writers who have hitherto treated of this subject, have given into a capital error with regard to the strength of this liquor, by directing too great a proportion of honey to be dissolved in the water. The usual practice of making it so strong as to bear an egg, is very wrong. The liquor is thereby rendered a mere stum, and this bad quality is still increased by the long boiling generally practised. It is scarcely possible to procure honey so pure but that some bee-bread, wax, or other substance is mixed with it; and this cannot be perfectly separated from it, so far as I know, but by boiling. On this account, therefore, the boiling of mead seems indisputably necessary. In order the more effectually to separate these impurities from the liquor intended to be boiled, it is advisable to mix some whites of eggs with it before it is put on the fire: very particular care must absolutely be taken to skim off the thick scum that rises upon it, the moment before it begins to boil, and this must be attentively continued so long as it does boil. The only intention of boiling being here to separate the impurities, and to make a perfect union of the water and the honey, both which purposes are very soon obtained, it evidently appears that the boiling need be of but very short duration. This circumstance should be

par-

particularly attended to in making of mead; because, the longer the boiling has been continued, the less will the liquor be disposed to ferment kindly. It is perhaps owing to our too long boiling only, that mead, highly esteemed by most of the northern nations, has long lain under discredit in this country; a discredit from which it might probably be retrieved, if due care were taken to prepare it rightly. The common method of boiling it too much has always prevented its fermenting sufficiently to remove its luscious sweetness; whereas, were it to undergo a due fermentation, that sweetness would go off, and the liquor would acquire a fine racy flavour.

SOME notable housewives have added hops to their mead. This helps to take off its sweetnes, and, as the bitterness of the hop goes off, gives it a pleasant flavour. A ferment is here, as in all vinous liquors that are boiled, generally wanted, to bring on a perfect fermentation: but as the least taint in the ferment will communicate itself to the whole liquor, due care should be taken that it be very sweet and good. Mead, judiciously managed on these principles, will keep for years, and be improved by age. It is racked, fined, &c. in the same manner as other white wines.

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